SAFETY PRECAUTIONS ENCLOSED

DO NOT DESTROY

This manual contains important safety information and should be made available to all personnel who operate and/or maintain this product. Carefully read this manual before attempting to operate or perform maintenance.

PRECAUCIONES DE SEGUIRIDAD

NO DESTRUIR

Este manual contiene información importante y debe estar al alcance de todo el personal que opera y/o mantiene este producto. Lea cuidadosamente este manual antes de intentar operar o efectuar cualquier mantenimiento a este producto.

INSTRUCTION MANUAL

Model 231
Model 7T2
Model 41
Model 15T2

Two-Stage
High Pressure
Industrial
Air Compressors

INGERSOLL-RAND®

AIR COMPRESSORS

Refer all communications to the nearest Ingersoll-Rand Full Service Distributor.
Para cualquier consulta, contacte a su Distributor Ingersoll-Rand más cercano.

Form SCD-453
May 1989

NOTICE

THE USE OF REPAIR PARTS OTHER THAN THOSE INCLUDED WITHIN THE INGERSOLL-RAND COMPANY APPROVED PARTS LIST MAY CREATE UNSAFE CONDITIONS OR MECHANICAL FAILURES OVER WHICH INGERSOLL-RAND COMPANY HAS NO CONTROL. INGERSOLL-RAND COMPANY SHALL BEAR NO RESPONSIBILITY FOR EQUIPMENT ON WHICH NON-APPROVED REPAIRS PARTS ARE INSTALLED.

The manufacturer reserves the right to make changes or add improvements without notice and without incurring any obligation to make such changes or add such improvements to products previously sold.

GLOSSARY

Group Assembly Parts List
Parts are listed in disassembly sequence, where applicable. Each assembly is broken down into subassemblies and detail parts which are idented with "bullet" (•) symbols in the DESCRIPTION column to indicate the relationship to the next higher assembly:

Assemblies and Detail Parts

- Attaching Parts for Assemblies and Detail Parts
- • Subassemblies
- • • Detail Parts for Subassemblies, etc.

Reference Number Column
The reference number is the number assigned to the part in the listing. The reference number corresponds to the item on the associated illustration. Where applicable, the following abbreviations might appear in this column:

NI Not Illustrated.

REF Reference Only. Refer to the figure and page noted in the description column.

Part Number Column
All numbers listed in this column are INGERSOLL-RAND part numbers, and must be specified when ordering replacement parts. The following abbreviations appear in this column:

NA Not Applicable. This abbreviation indicates items which are not used on particular models or packages.

NSS Not Sold Separately. These items must be ordered under the next higher assembly, or, where applicable, as part of a Step Saver Kit.

* Consumable Materials (lubricants, sealants, etc.). Purchase directly from your local INGERSOLL-RAND Air Center or Full Service Distributor.

** Part Number Varies. Specify the compressor bare speed and complete nameplate data when ordering.

Description Column
The description column indicates the item by standard name followed by modifiers. The modifiers identify specific characteristics (i.e. dimensions, capacity, pressure setting, etc.), and/or the particular location or function on the compressor. Always include the description when ordering replacement parts or kits.

Quantity Per Assembly Column
Quantities listed in this column reflect the number used in the next higher assembly, and are not necessarily the total quantity of the part used in the complete package. Specify the desired quantity when ordering replacement parts.

Recommended Spares Column
Quantities listed in this column reflect the number of each item which we recommend be kept on hand for maintenance or repair:

CLASS 1 MINIMUM. Recommended quantity for Domestic Service where interruptions in service are not important.

CLASS 2 AVERAGE. Recommended quantity for Domestic Service where interruptions in continuity of service are not objectionable.

CLASS 3 MAXIMUM. Recommended quantity for International or Domestic Service where interruptions in service are not acceptable.

Step Saver Kits
Step Saver Kits are available for all compressor models. These kits are designed to provide all of the parts you will need to perform routine maintenance and repair tasks. A list of available Step Saver Kits is included in the Parts List manual which came with your compressor. When ordering Step Saver Kits, please follow the instructions set out below for ordering replacement parts.

ORDERING INSTRUCTIONS

All parts listed in the Part List manual for your compressor are available through your local INGERSOLL-RAND Air Center or Full Service Distributor. Consult the Directory of Distributors included with your compressor to locate the distributor in your area.

When ordering replacement parts or Step Saver Kits, please specify:

1. The MODEL and SERIAL NUMBER as stamped on the compressor nameplate.
2. The FORM NUMBER of the Parts List manual.
3. The QUANTITY, DESCRIPTION and PART NUMBER exactly as listed.

EXAMPLE

Send the following parts for model	7100
Serial Number	T30000000
Literature Form Number	SCD-478A
1 Switch, Pressure - NEMA 1	37005907
2 Element, Filter	32012957
1 Gauge, Pressure	32013872

NOTA

EL USO DE PARTES PARA REPARACION DIFERENTES A LAS INCLUIDAS EN LA LISTA DE PARTES APROBADA DE INGERSOLL-RAND PUEDE CREAR CONDICIONES INSEGURAS O FALLAS MECANICAS SOBRES LAS CUALES INGERSOLL-RAND NO TIENE CONTROL. POR LO TANTO INGERSOLL-RAND NO PUEDE SER RESPONSABLE POR EQUIPOS EN LOS QUE SE HAN USADO PARTES NO APROBADAS.

El fabricante se reserva el derecho a hacer cambios o adicionar mejoras sin notificación y sin incurrir en la obligación de hacer dichos cambios o adicionar tales mejoras a productos vendidos previamente.

GLOSARIO

Lista de Partes de Conjuntos de Ensamble
Las partes están listadas en secuencia de desarme en donde sea aplicable. La relación de un artículo con su más alto e inmediato ensamble está indicado por una indentación (•). Por ejemplo en la columna de DESCRIPCIÓN:

Ensambles y partes detalladas

- Partes para ensambles y partes detalladas
- • Subensambles
- • • Partes detalladas para sub-ensambles etc.

Columna de Items
El número de item es el asignado a la parte en el listado. Este número de Item identifica la parte en la ilustración asociada. Las abreviaturas siguientes podrían aparecer en esta columna:

NI No ilustra.

REF Para la referencia. Refiera a la página e ilustración apropiada.

Columna de Numero de Parte
Todos los números son números de parte INGERSOLL-RAND los cuales deben ser especificados cuando se ordenen los repuestos. Las abreviaturas siguientes podrían aparecer en esta columna:

NA Significan que la parte no es aplicable a determinados modelos.

NSS Indican que la parte no se vende por separado para determinados modelos. Las letras

* Los Materiales Consumibles (lubricantes, adhesivos, etc.). Compredirectamente desde un INGERSOLL-RAND Distribuidor de Servicio o Air Center.

** El Número de Parte Varía. Especifique los datos completos de compresor cuandoordenación.

Columna de Descripcion
Esta columna de descripción contiene el nombre del artículo estándar con modificadores. La relación de un artículo con su próximo ensamble más alto se muestra en esta columna por una indentación. Siempre incluir la descripción cuando ordenadora conjuntos o partes dereemplazo.

Columna de Cantidad Por Ensamble
Las cantidades especificadas en esta columna son el número de partes usadas por cada ensamble superior y no necesariamente son el número total de partes del modelo en general. Especifique la cantidad deseada cuando partes ordenadoras de reemplazo.

Como Seleccionar Repuestos Recomendados
Este catálogo contiene una lista de partes que está incluidas en cada una de las siguientes clases de repuestos recomendados:

CLASE 1 MINIMA. Sugerida para uso doméstico donde interrupciones en la continuidad del servicio no son importantes.

CLASE 2 PROMEDIO. Sugerida para servicio doméstico donde algunas interrupciones en la continuidad del servicio no son objetables.

CLASE 3 MAXIMA. Sugerida para exportación o para servicio doméstico donde la interrupción en el servicio es objetable.

Conjuntos de Partes
Los conjuntos de Partes son disponibles para todos los compresors. Estosconjuntos se diseñan para proveer todas las partes usted necesitará desempeñarel mantenimiento de rutina y repara tareas. Una lista de Conjuntosdisponibles se incluye en el lista de partes que vino con su compresor. Cuando se ordenen repuestos recomendados o kits prácticos, siga el procedimiento descrito para partes del compresor.

INSTRUCCIONES DE ORDEN DE COMPRA

Todas las partes enumeraron en el Lista de Partes para su compresor son disponibles mediante su Air Center o Distribuidor de Servicio de INGERSOLL-RAND. Consulte el Directorio de Distribuidores incluyócon su compresor para ubicar el distribuidor en su área.

Cuando se ordenen repuestos, por favor especifique:

1. El MODELO y NUMERO DE SERIE como está impreso en la placa del compresor
2. El NUMERO DE FORMATO de la lista de partes.
3. La CANTIDAD, DESCRIPCION y NUMERO DE PARTE exactamente como fue listado.

EJEMPLO

Envíe las siguientes partes para un modelo	7100
Número de Serie	T30000000
Número de formato de la literatura	SCD-478A
1 Interruptor, Presión	37005907
2 Elemento, Filtro	32012957
1 Manómetro	32013872

INDEX

SECTION I
GENERAL DESCRIPTION

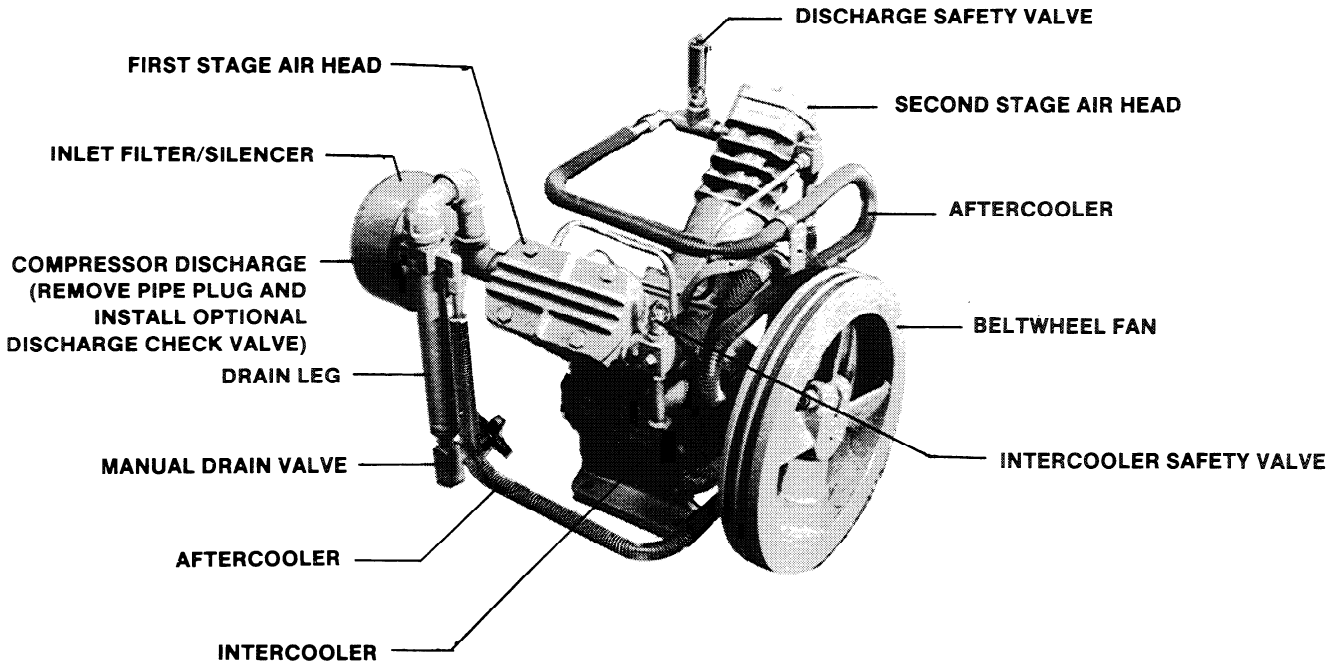


Figure 1-1. Model 231 Two-stage, two cylinder high-pressure air compressor.

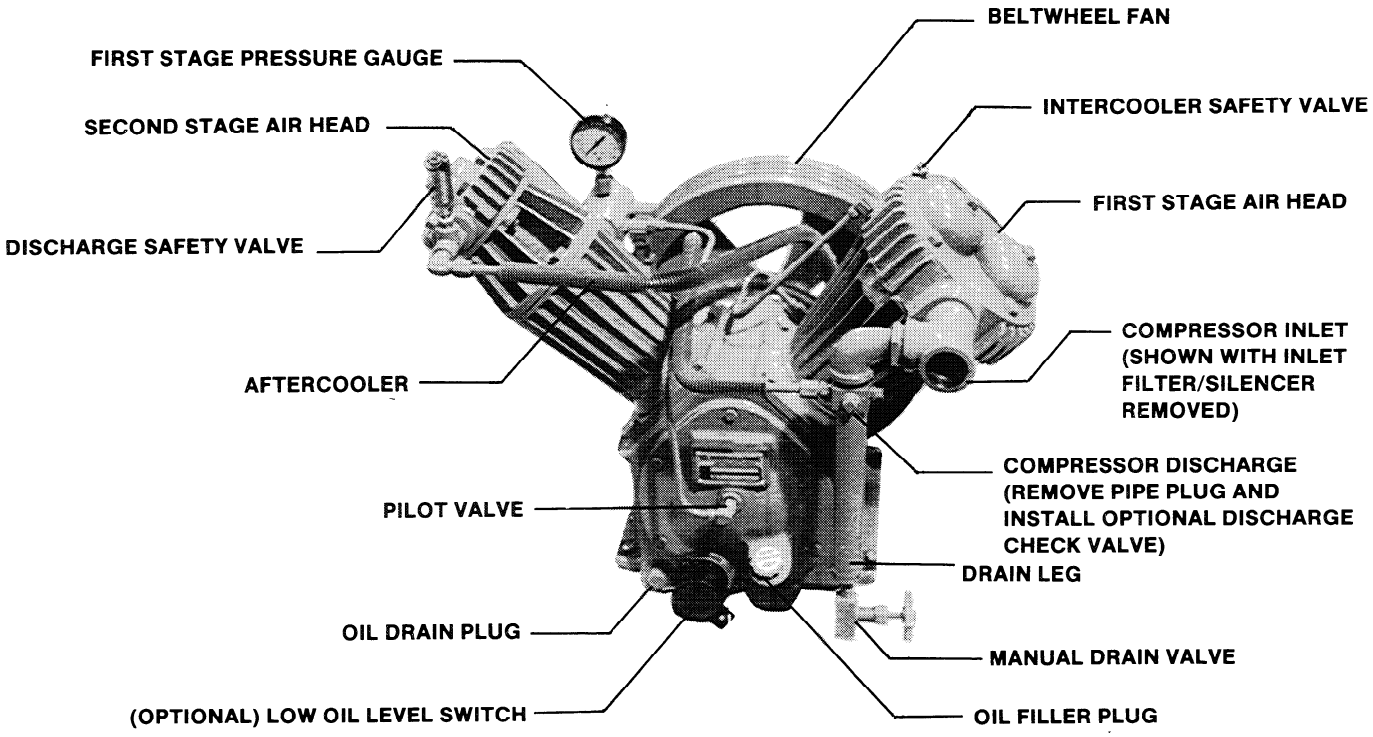


Figure 1-2. Model 41 Two-stage, two cylinder high-pressure air compressor.

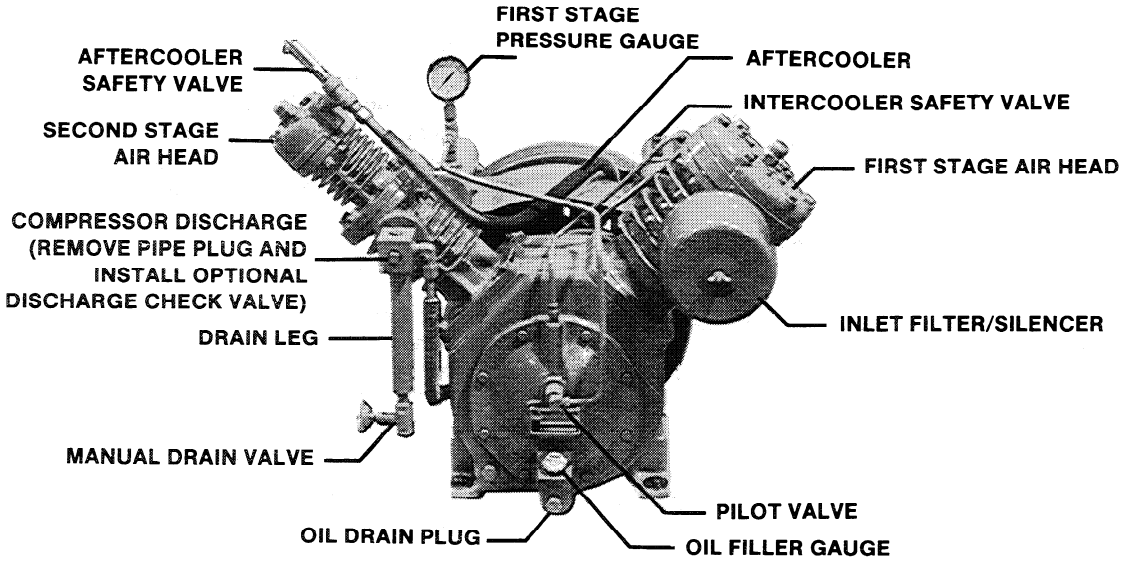


Figure 1-3. Model 7T2 Two-stage, two cylinder high-pressure air compressor.

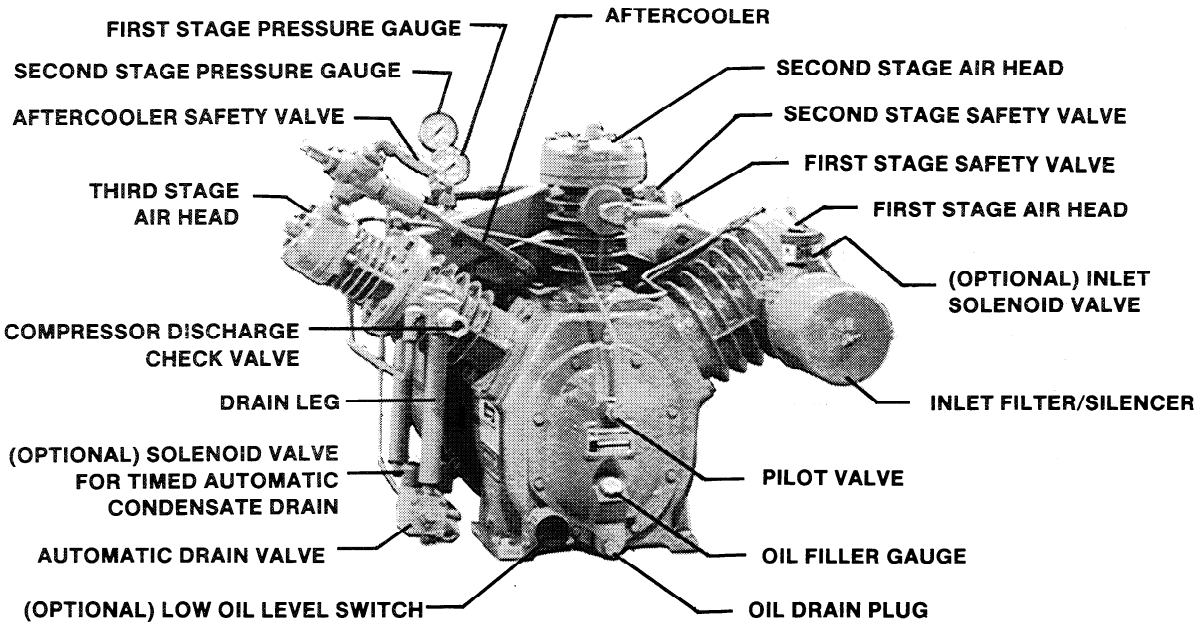


Figure 1-4. Model 15T2 Two-stage, three cylinder high-pressure air compressor.

APPLICATION

Ingersoll-Rand's Models 231 and 7T2 compressors are intended to supply air for applications requiring air pressure from 300 PSIG (21.2 kg/cm²) to 500 PSIG (35.2 kg/cm²). The Model 41 is intended to supply air pressure from 300 PSIG (21.1 kg/cm²) to 1000 PSIG (70.3 kg/cm²), and the Model 15T2 is intended to supply air pressure from 300 PSIG (21.1 kg/cm²) to 1000 PSIG (70.3 kg/cm²). The actual air delivery covers a range from 4.8 CFM (.135 m³/min) to 31.3 CFM (.886 m³/min).

The Models 231, 41, and 7T2 are compact, 2-stage, reciprocating compressors designed with properly proportioned compression ratios and efficient intercoolers to provide a dependable source of high pressure air.

The basic principle of operation is as follows: on the suction stroke of the first-stage piston, air at atmospheric pressure enters the first stage cylinder through the inlet filter and inlet valve. The compression stroke compresses this air to an intermediate pressure and discharges it through the discharge valve into the intercooler tubing where the heat of first-stage compression is removed by the action of the beltwheel fan passing cool air over the intercooler's finned tubes.

The suction stroke of the second-stage piston now draws the cooled air through the second-stage inlet valve and into the second-stage cylinder where it is compressed to a still higher pressure. On the compression stroke of the second stage, the air is compressed to its final pressure and forced out through the air cooled aftercooler and condensate separator into the external system.

The Model 15T2 is a compact, 3-stage, reciprocating compressor designed with properly proportioned compression ratios and efficient intercoolers to provide a dependable source of high pressure air.

The basic principle of operation is as follows: on the suction stroke of the first-stage piston, air at atmospheric pressure enters the first stage cylinder through the inlet filter and inlet valve. The compression stroke compresses this air to an intermediate pressure and discharges it through the discharge valve into the intercooler tubing where the heat of first-stage compression is removed by the action of the beltwheel fan passing cool air over the intercooler's finned tubes.

The suction stroke of the second-stage piston now draws the cooled air through the second-stage inlet valve and into the second-stage cylinder where it is compressed to a still higher pressure. On the compression stroke of the second stage, the air is forced into the third-stage steeple cylinder through the second-stage discharge valve, second-stage intercooler, condensate trap and third-stage inlet valve. On the compression stroke of the third-stage steeple piston, the air is compressed to its final pressure and forced out through the aircooled aftercooler and condensate separator into the external air system.

The finned tube intercoolers and aftercooler serve to dissipate heat from the compressed air, thus condensing contained moisture. This condensate is then separated and collected in suitably designed traps.

The compressors are equipped with a complete starting unloading system. This automatically relieves pressure from cylinders, intercoolers and the aftercooler, in addition to draining condensate from the traps, when the compressor stops.

INTERMITTENT DUTY FORMULA

Models operating above 200 psig (14 kg/sq. cm) are to be operated according to the "Intermittent Duty Formula."

INTERMITTENT DUTY FORMULA

Pump-up time should not ordinarily exceed thirty (30) minutes or be less than ten (10) minutes. Shut-down periods between cycles of operation should be at least equal to the pump-up time. Note: When the compressor is regulated by constant speed control, the shut-down period is the time the compressor is operating unloaded.

1. The formula is not to be regarded as a hard and fast rule.
2. A maximum operating time limit with a following cool down period is necessary to protect the valves and air heads against stabilized high operating temperatures, which could allow rapid valve carbonization.
3. A minimum operating time limit is required to prevent formulation of condensate which will cause rusting of cylinders, valves, and frame parts. Accumulation of condensate in the frame could give a false reading of oil level. Water and oil do not mix and their presence together cause rapid breakdown of the oil. The minimum time of operation should be long enough to allow the compressor to warm up sufficiently to evaporate condensated moisture.
4. When machine operation is too short for temperature to reach the normal level, a temperature control crankcase heater may be required. This is particularly true for areas of high humidity, such as along seacoasts.
5. All operating instructions should be read thoroughly and followed carefully by anyone operating these machines to give most efficient operation and longest possible machine life.

All inquiries for high-pressure compressor application where the "use" cycle differs from the "Intermittent Duty Formula" should be referred to the nearest Ingersoll-Rand branch office.

SECTION II
INSTALLATION AND START-UP RECOMMENDATIONS

Step. 1

Unload the compressor from delivering vehicle — the purchaser must arrange for adequate lifting equipment at the job site.

IMPORTANT NOTE: The purchaser assumes title to the compressor equipment at the manufacturers shipping dock. Immediately upon receipt of the equipment, it should be inspected for any damage that may have occurred during shipment. If damage is present, demand an inspection immediately by an inspector from the carrier. Ask him how to file a claim for damages.

Step. 2

Check compressor nameplate to be sure the unit is the model and size ordered. Do this before uncrating. Check receiver nameplate to be sure the tank is adequate for pressure at which you intend to operate.

Step 3.

Check motor nameplate to be sure motor is suitable for your electrical conditions (Volts-Phase-Hertz).

IMPORTANT NOTE: Do Not Use Triple Voltage 3 Phase Motor For 200-208 Voltage 3 Phase Application. Must Use 200 Volt Motor Only.

Step 4. LOCATION & FOUNDATION

NOTE: Ideal ambient temperature is (70°F) (21°C).

In cold climates, it is desirable to install the compressor within a heated building. Choose a clean, relatively cool location, and provide ample space around the unit for cooling and general accessibility. Place the beltwheel side toward the wall, leaving at least 15" (380mm) for air circulation to the beltwheel fan. The location should also be near a source of water and a drain line to simplify piping connections if a water-cooled aftercooler is to be used. (Note: If a detached receiver is to be used, consider placing the receiver outdoors to provide more effective heat dissipation, keeping in mind that condensed water in the receiver may freeze).

A well ventilated location should be selected for this machine when operating in very damp climates or under conditions of high humidity. These atmospheric conditions are conducive to the formation of water in the crankcase, and if adequate operation and ventilation are not provided, rusting, oil sludging and rapid wear of running parts will result. This is particularly true when operating on very intermittent duty applications.

Provide adequate fresh air and exhaust ventilation from area in which the compressor is located. Provide 1,000 cu. ft. fresh air per minute per 5 horsepower. Ventilation by gravity or mechanical means is approved.

Step 5. INLET PIPING

If the air in the vicinity of the compressor is unduly dirty or contains corrosive fumes, we recommend piping the air filter/silencer to a source of cleaner air or use an optional heavy duty filter. If it is found necessary to install inlet piping, make the line as short and direct as possible and as large, or larger than the diameter of the inlet connection at the compressor. The inlet piping must increase in diameter for every 50' (15.25m) of length. If the total length is between 50' (15.25m) and 100' (30.5m), increase the pipe diameter at the mid-point in the length, i.e., if the total length is 80' (24.4m), increase the pipe diameter at the 40' (12.2m) point. Attached the air filter/silencer to the end of the inlet air line, and if the inlet is piped outdoors, it should be hooded to prevent the entrance of rain or snow. See Figure 2-1. Fine airborne dust, such as cement and rock dust, require special filtration equipment not furnished as standard equipment on this compressor. Such filtration equipment is available from your local Ingersoll-Rand Distributor.

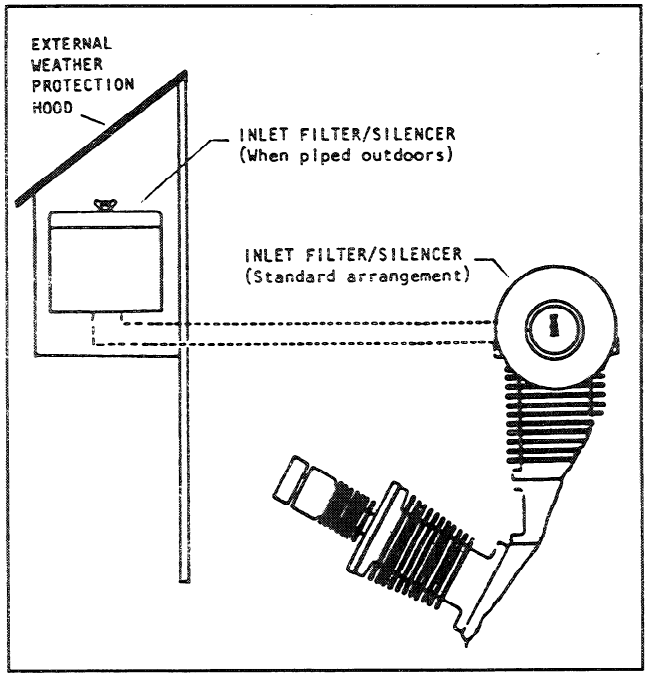


Figure 2-1. Typical Alternate Inlet Piping Arrangement.

Step 6. BASEPLATE-MOUNTED COMPRESSOR

The baseplate may be bolted to any substantial, relatively level floor or base. If such a surface is not available, an adequate base must be constructed. Should a concrete base be necessary, make certain the foundation bolts are positioned correctly to accept the baseplate feet, and that these bolts project at least 1" (25.4 mm) above the surface of the foundation.

The baseplate must be levelled and bolted in a manner which avoids pre-stressing the baseplate in order to prevent vibration and insure proper operation. The following technique is recommended for anchoring the compressor to its base:

A Tighten evenly, and to a moderate torque, the nuts of any three of the four baseplate feet, and check for level. If the baseplate is not level, insert metal shims under one or two of the feet to obtain level, and retighten the nuts.

B. Note-the distance the unanchored foot is elevated above the base and insert a metal shim of equal thickness under this foot to provide firm support. Shims must be at minimum the same dimension as bottom of foot.

C. After all shims are inserted and the baseplate is level, tighten the nuts on all baseplate feet to a moderate (not excessively tight) torque.

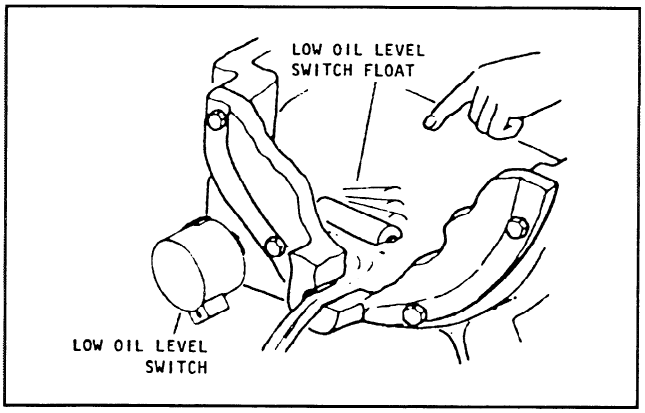
D. Check for baseplate stress by loosing nuts (one at a time), and note any upward movement of the mounting foot. Any noticeable movement indicates step B must be repeated.

Severe vibrations will result when nuts are pulled down tightly and feet are not level. This can lead to welds cracking or fatigue failure of baseplate. This is a very important part of installation.

THE COMPRESSOR SHOULD NEVER BE OPERATED WHILE MOUNTED TO THE SHIPPING CRATE SKID.

Step. 7
LOW OIL LEVEL SWITCH
(Optional Equipment)

A float activated switch can be installed to protect your compressor against damage due to insufficient oil level. The switch operates on a fail-safe principle and is mechanically actuated for sealed, friction-less operation. Low oil level in the frames causes the switch contacts to open, thus shutting the unit down until the proper oil level has been restored.



The Low Oil Level Switch is a single pole, double throw snap switch, available with an optional NEMA 1 or NEMA 7 enclosure. (See Wiring Diagram on Page 21 & 22 for connection of the Low Oil Level Switch.)

NEMA 1 ENCLOSURE: This switch has a maximum rating of 5 amps at 125,250 or 480 volt operation and uses a ⅜" nominal size flexible steel conduit, of a length as required, over the switch lead wires. The switch is not acceptable for greater than 480 volts.

NEMA 7 ENCLOSURE: This switch has a maximum rating of 4 amps at 250 volt operation and is equipped with a ½" NPT non-removable fitting.

⚠ WARNING

Hazardous voltage.

Connecting pressure switch or low oil level switch directly to motor can cause severe injury or death.

Always insure the pressure switch or low oil level switch is connected through the control circuit of a magnetic starter.

Proper protection against low oil levels depends on proper adjustment of the low oil level switch.

During the initial run, stop unit and drain one quart of oil from crankcase into clean can, and listen for switch to click or check with continuity tester.

This is a "float" type switch which sometimes gets cocked in shipping. If cocked or stuck, open disconnect switch, drain remaining oil, remove crankcase cover and then free the float. Reassemble and then reuse the same oil.

NOTE: If float is cocked in the low position, compressor cannot start.

Step 8.
MAGNETIC STARTER
(See Electrical Diagrams on Page 21 & 22).

This compressor must be equipped with an optional magnetic starter. Note-that the Pressure Switch, the Oil Level Switch and the On-Off Switch are wired to the operating coil of the magnetic starter and serves to interrupt current flow to the motor.

All starters must include thermal overload protection to prevent possible motor damage from overloading. These starters are furnished with the manufacturer's instructions for installation. Ingersoll-Rand cannot accept responsibility for damages arising from failure to provide adequate motor protection.

Step 9.
ELECTRICAL WIRING
(See Electrical Diagrams on Page 21 & 22).

To avoid invalidating your fire insurance, it is advisable to have the electrical work done by a licensed electrician who is familiar with the regulations of the National Electrical Code and the requirements of the local code.

Sizes of copper wire to use for distances up to 50 feet (15.3m) from the feeder—60 Hertz.

MOTOR HORSEPOWER	SINGLE PHASE	THREE PHASE—60HZ		
	230V AWG-(75°C)	200V AWG-(75°C)	230V AWG-(75°C)	460V-575V AWG-(75°C)
2	14	14	14	14
5	8	10	12	14
10	—	8	8	12
15		4	6	8

Sizes of copper wire to use for distances up to 50 feet (15.3 m) from the feeder—50 Hertz.

MOTOR HORSEPOWER	VOLTAGE—50 HZ				
	SINGLE PHASE	THREE PHASE			
	220V	190V	220V	360V	440V
2	10	12	14	14	14
5	6	8	10	12	14
10	—	4	6	8	10
15		3	4	6	8

The wire sizes recommended in the above table are suitable for the compressor unit. If other electrical equipment is connected to the same circuit, the total electrical load must be considered in selecting the proper wire sizes. A burned out motor due to low voltage may result unless it is properly protected.

Before wiring the compressor to the power supply, the electrical rating of the motor, as shown on the motor nameplate, must be checked against the electrical supply. If they are not the same, do not connect the motor.

It is important that the wire used be the proper size and all connections secured mechanically and electrically. The size of the wire shown in the table above is a safe guide.

If the distance is more than 50 feet (15.3 m), larger wire will probably be necessary and your electrical contractor or local electric company should be consulted for recommendations. The use of too small wire results in sluggish operation, unnecessary tripping of the overload relays or blown fuses.

Step 10. FUSES

Fuse failure usually results from the use of fuses of insufficient capacity. If fuses are the correct size and still fail, check for conditions that cause local heating, such as bent, weak or corroded fuse clips. Refer to the table below for recommendations on the proper fuse size to be used. Also refer to the regulations of the National Electrical Code and requirements of the local code.

DUAL ELEMENT FUSE SIZE—60 HERTZ
UL CLASS RK-5 600V

MOTOR HORSEPOWER	VOLTAGE—60 HZ				
	SINGLE PHASE	THREE PHASE			
	230V	200V	230V	460V	575V
2	17.5	12	10	5.6	4.5
5	35	25	20	10	9
10	—	50	40	20	17.5
15		60	60	30	25

DUAL ELEMENT FUSE SIZE—50 HERTZ
UL CLASS RK-5 600V

MOTOR HORSEPOWER	VOLTAGE—50 HZ				
	SINGLE PHASE	THREE PHASE			
	220V	190V	220V	380V	440V
2	25	17.5	15	8	6.25
5	50	40	35	17.5	15
10	—	75	60	35	30
15		90	80	45	40

Step 11. DISCHARGE PIPING

The following general instructions cover only the installation of discharge piping and placement of safety valves, pressure switch, pressure gauge, drain valves, shut-off valves, etc. in systems using a detached receiver. See Figure 2-2. Discharge piping should be the same size as the compressor discharge connection or the receiver discharge connection. All pipe and fittings must be certified safe for the pressures involved. Pipe thread sealant is to be used on all threads, and all joints are to be made up tightly, since small leaks in the discharge system are the largest single cause of high operating costs. If your compressor runs more than you believe it should, the most likely cause is a leaky pipe line. Leaks are easily located by squirting soap and water solution around the joints and watching for bubbles.

Figure 2-2 is a typical installation for a bare compressor connected to an air receiver. Refer to Figure 2-2 and observe the following precautions when installing the discharge line and the high pressure air receiver.

A The compressor discharge line may be high pressure tubing or pipe. The minimum size to use for maximum capacity for your particular model is as indicated below: Models 231 and 41 use a minimum 1/4" (6.35mm) I.D., Model 7T2 use a minimum 3/8" (9.5mm) I.D., and Model 15T2 use a minimum 1/2" (12.7mm) I.D.

The discharge line, fitting, high pressure air receiver, etc. must be certified safe for the pressure involved.

B. The line is to be short, direct and adequately braced. It is a good practice to install a shut off valve between the compressor discharge and the high pressure air receiver, and also between the high pressure air receiver and the point at which the air is used. Always install a high pressure ASME approved safety valve between the shutoff valve & the air bottle.

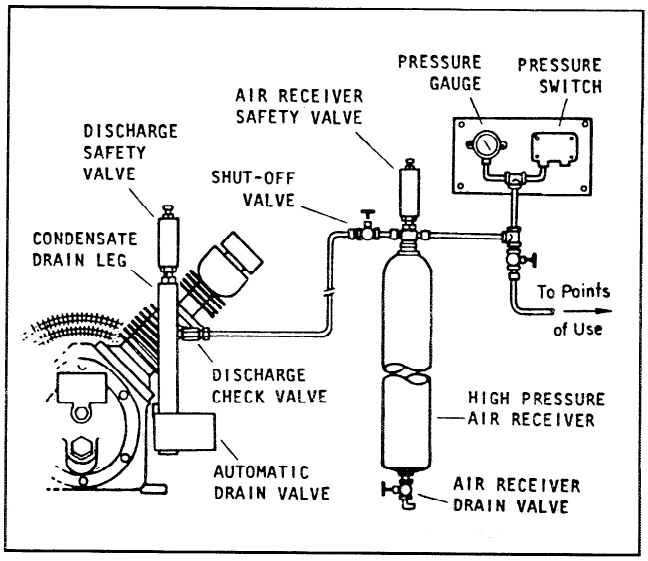


Figure 2-2. Typical piping arrangement for compressor and detached receiver.

C. Install the pressure switch and gauge at a pulsation free point in the system that registers actual air receiver pressure. Select a high point where condensate will not accumulate. The pressure switch may be mounted in any position, but both it and the gauge must be securely mounted against a solid surface. The connecting line is to be short and direct and certified safe for the pressure involved.

Wire the pressure switch according to the schematic diagram on page 21 & 22.

D. The compressor automatic drain valve discharge may be piped outdoors or to a suitable open drain. The drain pipe or tubing must be as large or larger than the drain fitting, and must be firmly secured.

⚠ WARNING

This machine contains high pressure air. Can cause injury or death from flying parts.

If an aftercooler, check valve, block valve, or any other restriction is added to the compressor discharge, an ASME approved safety valve must be installed between the compressor discharge and the restriction.

Step 12. COMPLETE WARRANTY REGISTRATION

Completion of the registration form indicates satisfactory installation and performance of start-up operations. If any defects are apparent in the equipment; contact the nearest I-R Distributor or Ingersoll-Rand District office. The I-R service literature included with the unit has instructions for minor adjustments. Minor adjustments are not considered warranty.

SECTION III
REGULATION

AUTOMATIC START AND STOP CONTROL

This type of regulation is used when the demand for air is small or intermittent, but where pressure must be continuously maintained.

Automatic Start and Stop Control is obtained by means of a pressure switch which makes or breaks an electrical circuit, starting and stopping the driving motor, thereby maintaining the air receiver pressure within definite limits. The pressure switch is piped to the receiver and is actuated by changes in air receiver pressure.

Automatic Start and Stop should only be used when motor starts no more than 6-8 times per hour.

PRESSURE SWITCH ADJUSTMENT

(Also see instructions furnished with switch).

The pressure switch automatically regulates the compressor, starting and stopping the driving motor at specific receiver pressures.

The range adjustment is used to set the operating point on the decreasing pressure and must be set first. To increase the operating point on decreasing pressure, with the switch mounted as shown in the illustration below and facing the switch, place a screw driver in the slot on the Range Adjustment Nut and turn from right to left.

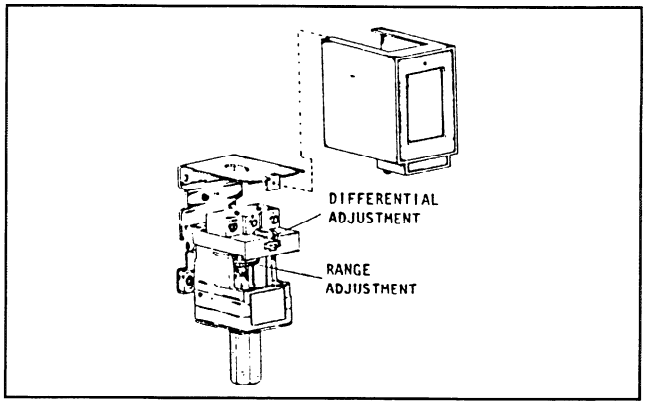


Figure 3-1. Pressure Switch Adjustment.

An independent adjustment of the operating point on increasing pressure is available on the adjustable differential. The adjustment, located in the center of the switch, (See Figure 3-1) is performed after the operating point on decreasing pressure is set by means of the Range Adjustment.

Adjust by turning the slotted screw clockwise to raise the operating point on increasing pressure and counter-clockwise to lower the operating point on increasing pressure. The operating point on decreasing pressure is not affected by this adjustment.

⚠ WARNING

This machine contains high pressure air. Can cause injury or death from flying parts.

Do not increase the cut-out setting of the pressure switch beyond the point originally established at the factory for your particular model.

CONSTANT SPEED CONTROL

Constant speed control loads and unloads the compressor while the compressor continues to run. The solenoid valve, located at the compressor inlet, controls this operation according to the rise and fall of the air receiver pressure. When the air pressure in the air receiver (bottle) reaches the pressure setting of the pressure switch, the pressure switch breaks electrical contacts, therefore interrupting the current flow to the inlet solenoid valve. This action causes the solenoid valve to close the compressor inlet and permits the compressor to run continuous without compressing air.

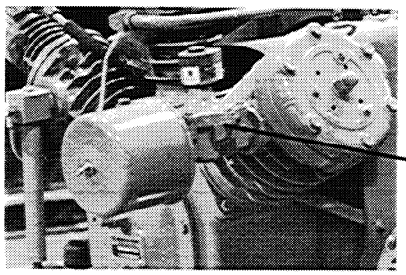


Figure 3-2. Typical Constant speed control inlet solenoid valve arrangement. (Supplied with optional constant speed control).

DUAL CONTROL

Dual control is the combination of both automatic start and stop and constant speed control operation. All models that require constant control operation will be shipped with the dual control option.

INTERMITTENT DUTY FORMULA

(Also see Page 6.)

Compressors operating above 200 psig (14 kg/sq. cm) are to be operated according to the "Intermittent Duty Formula."

INTERMITTENT DUTY FORMULA

Pump-up time should not ordinarily exceed thirty (30) minutes or be less than ten (10) minutes. Shut-down periods between cycles of operation should be at least equal to the pump-up time. Note: When the compressor is regulated by constant speed control, the shut-down period is the time the compressor is operating unloaded.

A pump-up time limit with the following cool-down period is recommended to protect the valves and heads against stabilized high operating temperatures, which could rapidly build up carbon in these areas.

All inquiries for high-pressure compressor application where the "use" cycle differs from the "Intermittent Duty Formula" should be referred to the nearest Ingersoll-Rand branch office.

SECTION IV
OPERATION

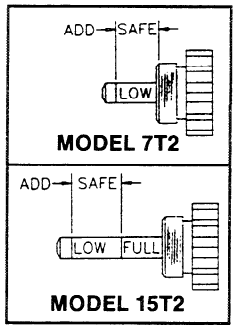
OPERATING CHECKS

Satisfactory operation of any piece of mechanical equipment depends, to a large degree, upon adherence to a preventive maintenance schedule.

To obtain optimum performance at minimum cost, observe the "Maintenance" guide on page 16.

COMPRESSOR LUBRICATION

Check the oil level in the bare compressor before each use by removing the oil filler plug and wiping clean. For Models 231 and 41, the oil should be level with the top thread of the oil filler hole. For Models 7T2 and 15T2, place the oil gauge with the writing up into the filler hole until the threads touch (DO NOT ENGAGE THE THREADS.) Remove the gauge and read the oil level. If oil level drops below the safe point, add oil to bring level back to the FULL mark. Do not over fill. Replace oil plug HAND TIGHTEN ONLY.



FRAME OIL CHANGE

Oil changes should be made every 500 hours of operation or every 90 days, whichever occurs first. Important: For maximum removal of impurities, drain only when frame oil is hot. After the operator has observed the condition of the oil from a number of changes, the length of time between changes may be extended if so warranted. Frame oil capacities are as follows: Model 231 — ⅞ Qt. (0.83 Liters). Model 41 — 2½ Qts. (2.37 Liters). Model 7T2 — 2½ Qts. (2.37 Liters). Model 15T2 — 5 Qts. (4.73 Liters).

⚠ WARNING

Flushing compressor frame with gasoline, kerosene or flammable fluid can cause severe injury or death.

Use a regular flushing oil to flush out compressor frame.

LUBRICATING OIL RECOMMENDATIONS

Ingersoll-Rand does not recommend any particular brand of oil, but a petroleum lubricating oil is preferred in this particular type of air compressor. The petroleum lubricating oil should be a non-detergent, containing only rust, oxidation, and anti-foaming inhibitors with either a naphthenic or paraffinic base.

The viscosity should be selected for the temperature immediately surrounding the unit when it is in operation.

OIL VISCOSITY TABLE

Temp. Range	Viscosity at 100°F (37.8°C)	
	SUS	Centistokes
40°F & Below (4.4°C & Below)	150	32
40°F & 80°F (4.4°C to 26.7°C)	500	110
80°F to 125°F (26.7° to 51.7°C)	750	165

The viscosities given in the table are intended as a general guide only. Heavy-duty operating conditions require heavier viscosities, and where borderline temperature conditions are encountered the viscosity index of the oil should be considered. Always refer your specific operating conditions to your industrial lubricant supplier for recommendations.

MOTOR LUBRICATION & CARE

Depending upon the type of electric motor driving your unit, the following lubricating schedule should be observed.

BALL BEARING MOTORS WITH GREASE FITTINGS - Ball bearing motors that have grease fittings and plugs near the bearings are to be repacked with grease once a year. Use a very good grade of ball bearing grease.

BALL BEARING MOTORS PRELUBRICATED FOR LIFE - These motors have no grease fitting or plugs near the bearing and do not require lubrication.

Several major points contributing to proper motor operation and care are given in the following paragraphs. For more detailed instructions, refer to the manufacturers' specific recommendations.

It is also a good practice to monthly blow off the motor windings with a jet of air to prevent an accumulation of dirt. An occasional revarnishing of the windings will greatly prolong the life of the motor.

If the motor is located in an atmosphere where it is exposed to appreciable quantities of water, oil, dirt or fumes, it must be specially constructed.

AIR INLET FILTER/SILENCER

It is very important that the air inlet filter/silencer be kept clean at all times. A dirty inlet filter reduces the capacity of the compressor.

⚠ WARNING

Cleaning air inlet filter with gasoline, kerosene or flammable fluid can cause an explosion or fire which can result in severe injury or death.

Use warm soapy water for cleaning air inlet filter.

The filtering element should be taken out at least once a month and cleaned by vacuuming or washing in mild detergent and water. Allow to dry and then reinstall.

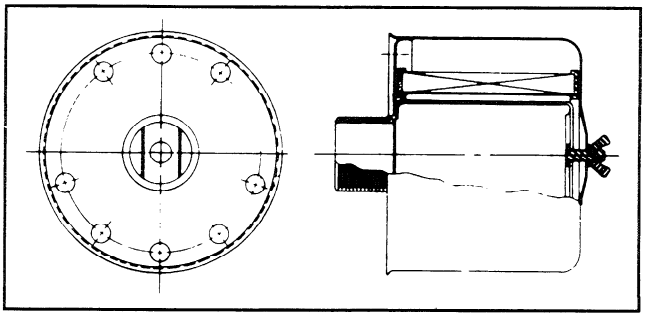


Figure 4-1. Typical Air Inlet Filter/Silencer.

The standard air inlet filter is suitable only for normal industrial applications. Should the compressor be located in an area where the atmosphere contains a heavy concentration of dust and dirt, an air filter utilizing a specially designed, heavy duty (4 micron) element should be used.

All applications of this nature should be referred to the nearest Ingersoll-Rand sales office or distributor.

AIRCOOLED INTERCOOLER

An aircooled intercooler is located between each stage of compression to remove the heat of the previous stage of compression before the air enters the next higher compression stage.

Never permit the air flow to these tubes to become obstructed, and clean the surfaces of the tubes whenever deposits of oil, dirt or grease are observed. Use a non-flammable safety solvent for cleaning purposes. During regular overhaul periods, the tubes should be removed from their headers and inspected internally. If the interior of the tubes requires cleaning, cap one end and fill it with a non-flammable safety solvent to help loosen internal deposits of oil, dirt and carbon. Always flush the tubes with warm water and permit them to dry thoroughly before replacing.

Two-stage compressors have one intercooler located between the discharge of the first-stage and the intake to the second-tage.

Three-stage compressors have two intercoolers, one located between the discharge of the first-stage and the intake to the second-stage cylinder, and the second intercooler located between the discharge of the second-stage and the intake to the third-stage cylinder.

When necessary, the intercooler will be fitted with a condensate drain leg and valve. When these valves are provided, the condensate should be drained off at periodic intervals.

The intercooler gauge pressures are a true indication as to the correct operation of the compressor. The cooler pressure will vary with individual machines, with operating temperatures, and with elevation above sea level. Note the pressure when the machine is new, and any marked deviation thereafter requires investigation of the cause; thus, possible troubles may be discovered before serious damage results.

If the intercooler pressure is abnormally high, one or more of the following conditions may be present in the next stage of compression.

1. Inlet or discharge valve broken, stuck or leaking badly.
2. Inlet or discharge valve spring broken or weakened enough to allow air "slip."
3. Carbonized valves or passages which restrict air flow.
4. Air leaking past valve seat.

If the intercooler pressure is abnormally low, one or more of the following conditions may be present in either preceding stage of compression.

1. Piston rings broken or stuck in grooves.
2. Head gasket blown or head not bolted tightly to cylinder.
3. Inlet valve leaking or stuck, spring broken or weakened.
4. Discharge valve broken, stuck or leaking.
5. Leaks in intercooler around the tube fittings or a cracked and leaking tube.

⚠ WARNING

This machine contains high pressure air. Can cause injury or death from flying parts.

Do not open an intercooler drain valve while the compressor is running.

INTERCOOLER PRESSURE CHART

Due to variable operating conditions, the pressure listed in the chart may not be identical to the intercooler pressure read on your unit. In this case, it is recommended that the intercooler pressure be recorded when the machine is new, and this reading should be used as the normal intercooler pressure.

Model	Discharge Pressure	1st Stage Intercooler	2nd Stage Intercooler
231	500 PSIG (34.48 Bar)	78 to 82 PSIG (5.38 to 5.65 Bar)	
41	500 PSIG (34.48 Bar)	80 to 85 PSIG (5.52 to 5.86 Bar)	
	800 PSIG (55.16 Bar)	89 to 93 PSIG (6.14 to 6.41 Bar)	
	1000 PSIG (68.95 Bar)	94 to 98 PSIG (6.48 to 6.76 Bar)	
7T2	500 PSIG (34.48 Bar)	68 to 78 PSIG (4.69 to 5.38 Bar)	
15T2	500 PSIG (34.48 Bar)	35 to 37 PSIG (2.41 to 2.55 Bar)	165 to 180 PSIG (11.38 to 12.41 Bar)
	750 PSIG (51.71 Bar)	37 to 39 PSIG (2.55 to 2.69 Bar)	180 to 200 PSIG (12.41 to 13.79 Bar)
	1000 PSIG (68.95 Bar)	38 to 41 PSIG (2.62 to 2.83 Bar)	215 to 240 PSIG (14.82 to 16.55 Bar)

AIR-COOLED AFTERCOOLERS

Compressor models 231, 41, 7T2, and 15T2 are equipped with an air-cooled aftercooler, which resemble the intercooler's finned tubes. The aftercooler functions to remove the heat of compression from the final discharge air before it is stored in the receiver.

Do not permit the air flow to the fan-belt wheel to become obstructed, and keep the aftercooler tubes and fins free from dust and dirt. The aftercooler condensate drain trap should be drained as frequently as necessary to prevent condensate water from entering the compressor.

SAFETY VALVE

A safety valve is provided in each intercooler. If an intercooler safety valve blows, and continues to blow for more than a minute, the compressor should be stopped at once. It indicates a leaky, broken or carbonized discharge valve in the next higher pressure cylinder.

A discharge safety valve is furnished as standard equipment on all models. See safety valve chart below:

SAFETY VALVE SETTING PSIG (Bar)

MODEL	DISCHARGE	FIRST-STAGE INTERCOOLER	SECOND-STAGE INTERCOOLER
231	800 PSIG (55.2 Bar)	125 PSIG (8.6 Bar)	———
41	1300 PSIG (89.6 Bar)	160 PSIG (11.0 Bar)	———
7T2	800 PSIG (55.2 Bar)	160 PSIG (11.0 Bar)	———
15T2	1300 PSIG (89.6 Bar)	80 PSIG (5.5 Bar)	260 PSIG (17.9 Bar)

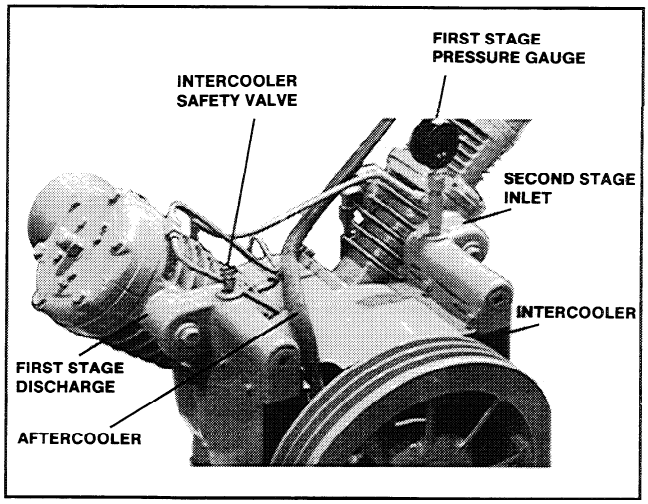


Figure 4-2. Typical Intercooler Tubes and Safety Valves.

⚠ WARNING

This machine contains high pressure air. Can cause injury or death from flying parts.

Do not remove, change, or make substitutions for the safety valves. They should be replaced only by genuine I-R replacement parts.

STARTING UNLOADING SYSTEM

OPERATION OF STARTING UNLOADING SYSTEM — The purpose of the system is to relieve cylinder pressure when the compressor stops permitting it to start against a light load, increasing the life of the driver and belts and also reducing the possibility of tripping the overload relay. The system operates in the following manner:

As shown in Figure 4-3 & Figure 4-4, the centrifugal unloader is attached to the end of the crankshaft, thus when the compressor is in operation, centrifugal force acts upon the unloader weights and they swing outward. (See Figure 4-5 and Figure 4-6). When the compressor stops, these weights retract. (Figure 4-3 and Figure 4-4) permitting the thrust pin spring to move the plunger and thrust pin outward. The thrust pin opens the pilot valve and the trapped air pressure escapes from the cylinder and intercooler through a passage in the frame end cover (See Figure 4-6), through the unloader tube and to atmosphere through the inlet filter/silencer.

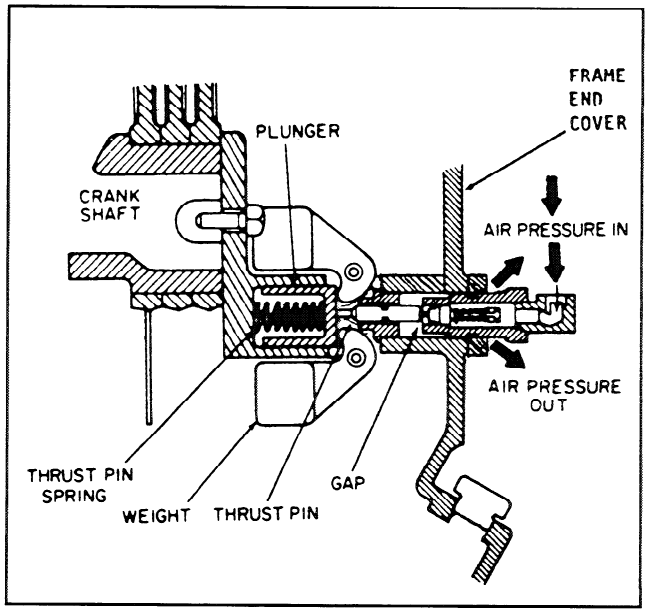


Figure 4-3. Position of weight and thrust pin when compressor is stopped. (Models 231, 41).

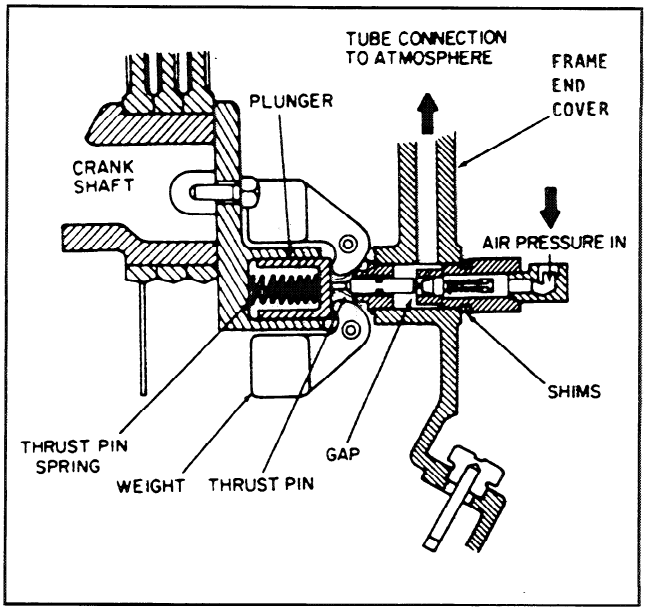


Figure 4-4. Position of weight and thrust pin when compressor is stopped. (Models 7T2, 15T2).

When the compressor starts, centrifugal force acts upon the unloader weights and they swing outward. This permits the plunger and thrust pin to move inward and the pilot valve to close. The escape path to atmosphere for the cylinder pressure is now closed and the compressor pumps air in a normal manner.

If the pilot valve tube line is excessively hot, it is a good indication that the pilot valve is leaking and adjustment is required.

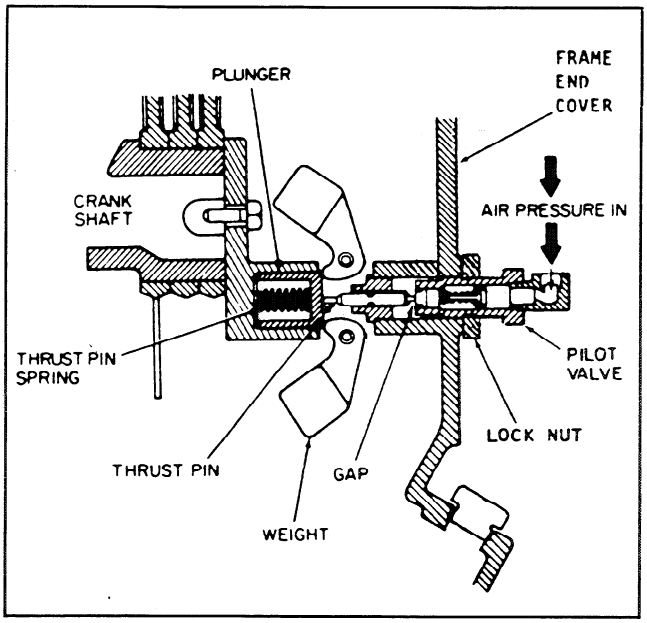


Figure 4-5. Position of weight and thrust pin when compressor is operating. (Models 231, 41).

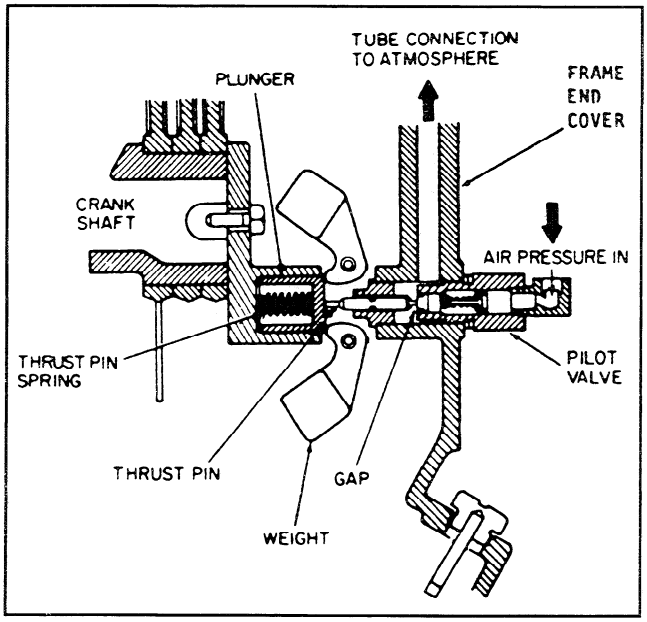


Figure 4-6. Position of weight and thrust pin when compressor is operating. (Models 7T2, 15T2).

PILOT VALVE ADJUSTMENT

To adjust the pilot valve, refer to Figures 4-3 and 4-5 for Models 231 and 41, and proceed as follows:

1. Stop the compressor. (Disconnect the electrical supply main switch to prevent accidental start-up.)
2. Remove the pilot valve tube, fittings, and loosen lock nut.
3. Screw pilot valve assembly into frame end cover until thrust pin is felt. Advance valve assembly to ¼ to ½ turn.
4. Hold valve assembly at this position and tighten lock nut.
5. Reconnect pilot valve tubing and start the compressor. Place hand over front side of lock nut.
6. If there is no flow of air, pilot valve is adjusted properly. If air flow is evident, re-adjust valve starting with step (1).

To adjust the pilot valve, refer to Figures 4-4 and 4-6 for Models 7T2 and 15T2, and proceed as follows:

1. Stop the compressor. (Disconnect the electrical supply main switch to prevent accidental start-up.)
2. Remove the pilot valve tube and the tube fittings.
3. Remove the pilot valve body and all existing shims.
4. Screw the pilot valve body back into the frame end cover (without any shims) until contact with the thrust pin is felt. Advance the pilot valve body ¼ to ½ turn more.

If contact with the thrust pin cannot be felt, the following steps may be necessary to locate the contact point.

1. Insert a small instrument (Punch, rod, nail, etc.) into the end of the pilot valve until it contacts the valve stem.
2. While still inserted in the pilot valve, make a mark on the instrument even with the outside edge of the pilot valve body.
3. Keeping the instrument pressed lightly against the valve stem, screw the pilot valve body into the frame end cover. When the mark on the instrument starts moving out away from the edge of the pilot valve body, contact has been made with the thrust pin.
4. Advance the pilot valve body ¼ to ½ turn more and proceed with step five.
5. Measure the gap between the pilot valve body and the frame end cover. (See Figure 4-4).
6. Remove the pilot valve body and add enough shims to fill the gap measured in step five.
7. Screw the pilot valve body back into the frame end cover until the body is tight on the shims.
8. Reconnect the pilot valve tube and tube fittings.

If leakage still exists repeat the above steps. If leaking cannot be stopped by adjustment, replacement of the pilot valve may be required. Use the above procedure when installing the new pilot valve.

BREATHER TUBE

The breather tube connects the interior of the frame to the inboard side of the inlet filter/silencer. This connection permits pulsations, created by the reciprocating action of the pistons, to be vented to atmosphere, thus preventing any pressure build up within the frame.

OIL CONSUMPTION CHECK

A rule of thumb for determining a "passing grade" for oil consumption is to consider consumption at or above 25 horsepower-hours per ounce to be acceptable.

To apply this rule, consider the size of machine; say a 5 hp unit uses 2 ounces of oil every 10 hours of operation. Five (5) hp x 10 hours equals 50 horsepower hours, divided by 2, equals 25 horsepower hours per ounce.

$$\frac{\text{Motor Horsepower} \times \text{Hours of Operation}}{\text{Ounces of Oil Used}} = \text{Horsepower Hours per Ounce}$$

Machines using more than one (1) ounce of oil per 25 horsepower-hours would be classed as not meeting commercial standards, and further corrective action is recommended.

SECTION V
TROUBLE GUIDE

TROUBLE	CHECK POINT NUMBERS
Oil Pumping	1-6-8-10-17-21-22
Knocks or rattles	4-16-18-20-22-23-24
Air delivery has dropped off	1-5-17-18-19-21-22-35
Safety valve pops	18-19-33
Trips motor overload or draws excessive current	7-13-14-15-16-18-19-22-23-25-26
Water in frame or rusting in cylinders	2-10-11
Excessive starting and stopping (Auto Start and Stop Models)	2-5-12
Compressor doesn't unload when stopped	18-19-31-32
Condensate drain trap will not drain automatically	19-31-32
Compressor runs excessively hot	2-3-9-18-27
Compressor won't come up to speed	13-19-26
Light flicker when compressor runs	13-14-26
Abnormal piston, ring or cylinder wear	6-7-9-10-26-28
Air and/or condensate leaking from automatic drain valve	29-30-31-32
Unit very noisy when operated	4-18-19

CHECK POINT NUMBERS/TROUBLE CAUSE

1. Clogged Intake Filter.
2. Leaking Check Valve.
3. Air to fan blocked off or fan shroud not in place.
4. Loose beltwheel, motor pulley, or motor with excessive end play in shaft.
5. Air leak in piping on machine or in outside system.
6. Oil viscosity too low.
7. Oil viscosity too high.
8. Oil level too high.
9. Oil level too low.
10. Detergent type oil being used. Change to non-detergent type with rust and oxidation inhibitor.
11. Extremely light duty or located in a damp humid spot.
12. Readjust pressure switch setting. (Increase differential)
13. Check line voltage, motor terminals for good contact, tight starter connections, proper starter heaters.
14. Poor power regulation (unbalanced line). Consult power company.
15. V-Belt pulled excessively tight.
16. Loose motor fan.
17. Defective inlet solenoid valve.
18. Leaking, broken, carbonized or loose valves, or restricted air passages.
19. Automatic condensate drain valve defective.
20. Carbon on top of piston.
21. Piston rings broken or not sealed in, end gaps not staggered, stuck in grooves, rough, scratched, or excessive end gap (over .020" worn) (.508 mm) or side clearance (over .006%) (.152 mm).
22. Cylinder or pistons scratched, worn or scored.
23. Worn or scored connecting rod, piston, piston pin or crankpin bearings.
24. Defective ball bearing on crankshaft or on motor shaft.
25. R.P.M. too high. Check with tachometer and refer to motor nameplate for correct r.p.m.
26. Voltage too low. Check with voltmeter and refer to motor nameplace for correct voltage.
27. Wrong direction of rotation.
28. Extremely dusty atmosphere. Need more effective air inlet muffler and cleaner.
29. Ruptured seat diaphragm in automatic condensate valve.
30. Actuating piston in automatic drain valve sticking.
31. Lubricate automatic drain valve piston o-ring.
32. Defective condensate solenoid valve.
33. Defective condensate solenoid valve timer.
34. Defective safety valve.
35. Defective inlet solenoid valve.

SECTION VI
MAINTENANCE

⚠ WARNING

This machine contains high pressure air.
Can cause injury or death from flying parts.

Always release pressure from compressor and air receiver before removing caps, plugs, fittings, covers; etc.

⚠ WARNING

Hazardous voltage.
Can cause severe injury or death.

Disconnect main power before servicing compressor.

MAINTENANCE OPERATION	SERVICE INTERVAL				
	Operating Hours/Months - whichever comes first				
	500/3	1000/6	1500/9	2000/12	2500/15
COMPRESSOR					
Frame Oil Level - Check	Daily				
Air Inlet Filter - Inspect and Clean	Monthly (Weekly in Dusty Locations)				
Inspect Oil for Contamination —Change if necessary	Monthly				
Frame Oil—Change Petroleum Lube	X	X	X	X	X
Automatic Drain Valve Piston O-Ring —Lubricant O-Ring with Lubricant capable of 200°F	X	X	X	X	X
Compressor Valves - Inspect, Clean or Replace				X	
Intercooler Clean Exterior	Monthly				
Low Oil Level Switch - Check Operation	X	X	X	X	X
Operate Safety Valves - Manually	Monthly				
Clean Cylinder Cooling Fins	Monthly				
V-BELT DRIVE					
Belt Tension - Check	Monthly				
MOTOR					
Motor Bearings - Check and Lubricate				X	
Clean	Monthly—(Weekly in Dusty Locations)				
AFTERCOOLER					
Aircooled: Clean externally	Monthly — (Weekly in Dusty Locations)				
Clean air flow internally				X	
RECEIVER					
Drain Condensate - Manual	Daily				
Operate Safety Valves	Monthly				
GENERAL					
Tighten or check all bolts (retorque)	Monthly				
Check for Unusual Noise and Vibration	Daily				
Inspect for Air Leaks	Monthly				

GENERAL

The maintenance section of this book covers only those operations with which maintenance personnel may not be too familiar. It is expected that the average mechanic's training and experience will permit him to perform the more common maintenance functions without the need for detailed instructions.

AIR VALVE CLEANING
(Model 231)

Ingersoll-Rand stainless steel finger valves are quick-acting, durable, realiable and easily serviced. Valves are readily accessible and may be removed without disturbing piping. See Figure 6-1.

To clean the valves, take out the air head cap screws and remove the head and valve plate from the cylinder. Remove the valves from the valve plate and clean both the valve and seat by brushing with a stiff bristle brush (not wire). If necessary, use a non-flammable safety solvent to loosen dirt, oil or carbon deposits. Should it be necessary to scrape, do so lightly to prevent marring the valve or seating surface.

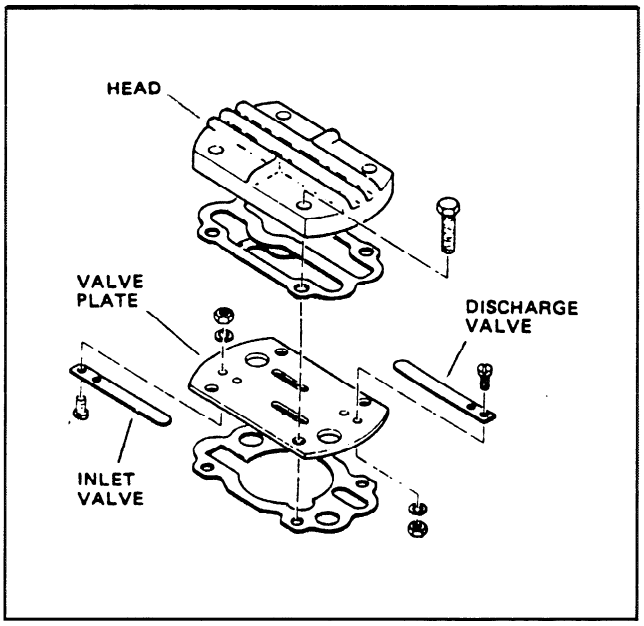


Figure 6-1. Finger Valves

Handle the valves with care and be careful not to nick or scratch them. When replacing a valve, make certain it will lie flat against the seating surface surround the port hole; otherwise, the valves will leak air, resulting in carbonization and reduced compressor output.

AIR VALVE CLEANING
(Model 41)

To clean these valves, first remove the valve cap's cap screws. Unscrew the valve cage, thus exposing the valve assembly. Lift the valve from its seat, using extreme care not to damage the seating surfaces. See Figure 6-2.

If necessary to take the valve apart to get it clean, be careful not to damage the valve seat by holding it in a vise or wrench. A good way to hold the valve while turning off the valve stud nut is to clamp in a vise a pair steel pins about the same diameter as the port holes in the valve. These pins should be spaced so they will enter the valve ports and prevent the valve from turning when removing the nut.

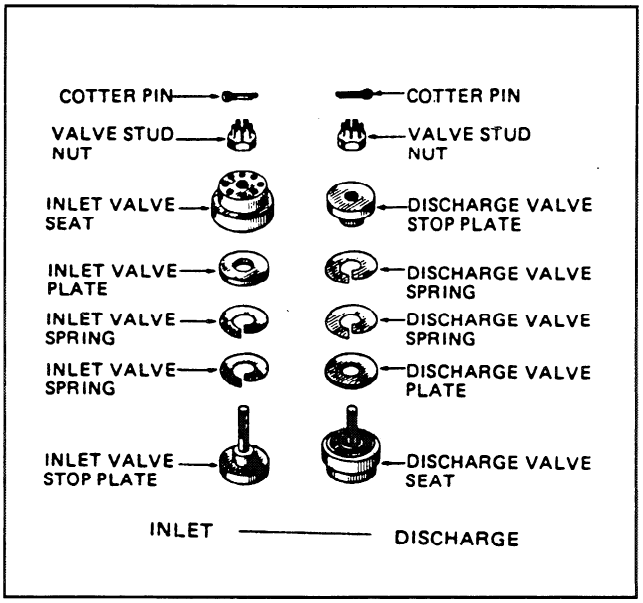


Figure 6-2. Plate Type Valves

AIR VALVE CLEANING
(Models 7T2 and 15T2)

To remove and clean a concentric ring valve, observe the following step-by-step procedure:

1. If the air heads are equipped with unloaders, disconnect the tubing to the unloaders, remove the unloader capscrews and lift the unloaders off the air head.
2. Loosen the valve acorn nuts, then take out the air head capscrews and remove the air head from the cylinder.
3. The valve itself may now be disassembled. To facilitate the valve disassembly, screw two bolts part way into the tow threaded ports located in the valve seat. Clamp these bolts firmly in a wise and remove the locknut and hex nut. Note the manner in which the valve parts are assembled and replace them in the same order and position.

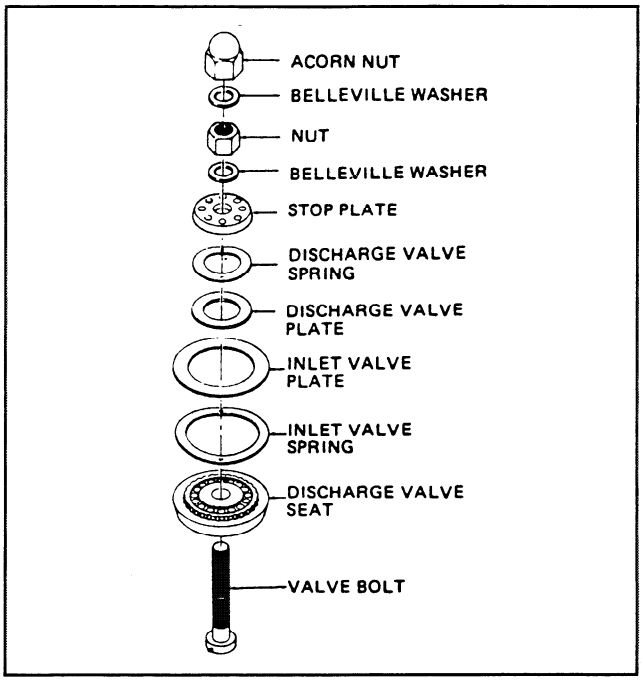


Figure 6-3. Concentric Ring-Type Valve

NOTE: Handle the valve parts with care. Do not nick, scratch or bend them.

4. The valve parts may be cleaned by light scraping or stiff bushing (do not use a wire brush.) If necessary, use a non-flammable safety solvent to loosen dirt, oil or carbon deposits.
5. Reassemble the valve parts in their proper sequence and position. Make absolutely certain that the stop-plate is centered properly on its guide; otherwise, the valve will be damaged when it is pulled up tight in the air head. Replace the valve hex nut and washer on the valve bolt. Tighten the valve hex nuts to the following torque:
   High pressure valve assembly - 65 ft. lbs. (88 Nm.) dry torque
   Low pressure valve assembly - 110 ft. lbs. (149 Nm.) dry torque
6. Before replacing the valve in the air head, scrape the old shellac off the valve bolt steel washer and coat it with new shellac to prevent air from leaking under the washer. Replace the acorn nut and tighten it to the lower limit of the torque valve, recommended below. Do not over tighten this nut, since this will distort the springs and plates, causing the valve to leak. After the valve has been replaced in the air head, make certain that the valve operates freely by lifting at its edges with a knife blade.
7. Replace the air head gaskt on the cylinder; then replace the air head. Tighten the air head capscrews to the torque recommended below and replace the unloader if the unit is so equipped.

BELT INSTALLATION AND ADJUSTMENT

When installing new belts, do not pry the belts over the pulley grooves. The proper method of removing an installing new belts is to loosen the anchor screws and the belt tightener screw, Figure 6-3, and push the motor toward the compressor. Use the tightener screw to adjust belt tension on new belts.

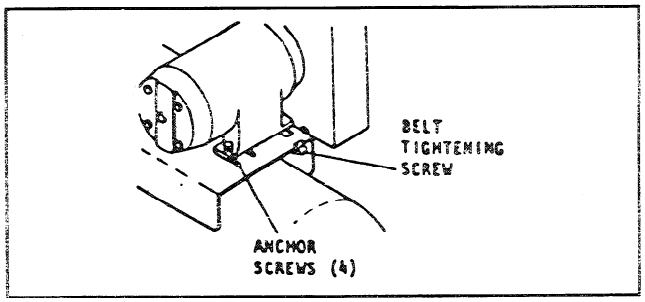


Figure 6-4. Belt Adjustments.

It is important that the belts be properly adjusted. A belt that is too loose will slip and cause heating and wear, and a belt that is too tight may overload the bearings. A quick check to determine if belt adjustment is proper may be made by observing the slack side of the belt for a slight bow when the unit is in operation. See Figure 6-5. If a slight bow is evident, belts are usually adjusted satisfactorily. However, the recommended method of checking belt tension is by the more accurate spring scale measurement method that follows:

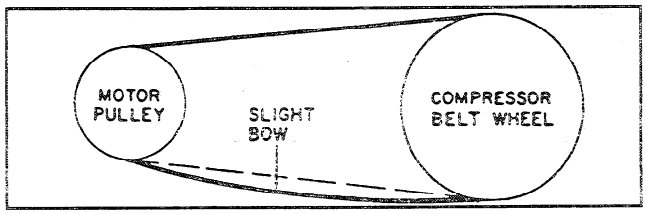


Figure 6-5. Visual Method.

A. Measure the belt span (t) as shown in Figure 6-4.

B. At the center of the span (t), apply a force (perpendicular to the span, by attaching a spring scale to the two outside belts. The force applied to the spring scale should be sufficient to deflect the belts 1/64" (.396 mm) for every inch of span length (t). For example: The deflection of 100" (2540 mm) span would be 100/64" or 1 9/16" (39.6 mm), thus, the force applied to the spring scale should deflect the belts to 1 9/16" (39.6 mm).

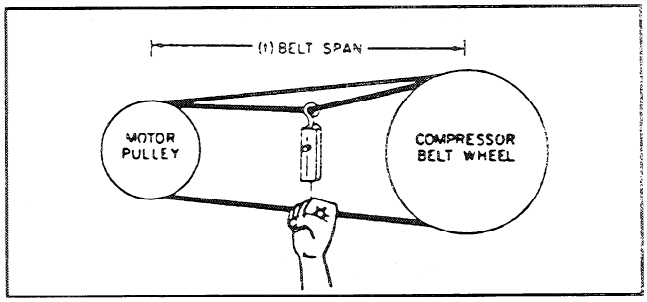


Figure 6-6. Spring Scale Method.

C. When the belts are deflected the necessary distance, compare the spring scale reading (in lbs. force) with the value given in the following table.

STANDARD BELT TENSION

Belt Type	Normal Tension	105% Normal Tension
A	1¼ lbs. (.565 kg)	1⅞ lbs. (.85 kg)
B	2¾ lbs. (1.25 kg)	4 lbs. (1.81 kg)
C	5½ lbs. (2.5 kg)	8¼ lbs. (3.74 kg)

If the reading is between the value for normal tension and 150% normal tension, the belt tension should be satisfactory. A reading below the value for normal tension indicated the belt slack should be reduced, and conversely, a reading exceeding the value for 150% normal tension indicated the belt slack should be increased. Experienced has shown that a new drive can be tightened initially to two times normal tension to allow for any drop in tension during run in.

TORQUE VALUE TABLE

NATIONAL COARSE	GRADE 2		GRADE 5		GRADE 8	
Dia. Pitch						
1/4" — 20	48 In. Lb.	5 Nm.	72 In. Lb.	8 Nm.	108 In. Lb.	12 Nm.
5/16" — 18	96 In. Lb.	11 Nm.	144 In. Lb.	16 Nm.	18 Ft. Lb.	24 Nm.
3/8" — 16	15 Ft. Lb.	20 Nm.	23 Ft. Lb.	31 Nm.	31 Ft. Lb.	42 Nm.
7/16" — 14	24 Ft. Lb.	33 Nm.	36 Ft. Lb.	49 Nm.	51 Ft. Lb.	69 Nm.
1.2" — 13	37 Ft. Lb.	50 Nm.	56 Ft. Lb.	76 Nm.	80 Ft. Lb.	108 Nm.
9/16" — 12	53 Ft. Lb.	72 Nm.	81 Ft. Lb.	110 Nm.	116 Ft. Lb.	157 Nm.
5/8" — 11	68 Ft. Lb.	92 Nm.	113 Ft. Lb.	153 Nm.	160 Ft. Lb.	217 Nm.
3/4" — 10	131 Ft. Lb.	177 Nm.	203 Ft. Lb.	275 Nm.	286 Ft. Lb.	388 Nm.

We recommend the use of a torque wrench on all bolts, capscrews, and nuts using the values in the following table. The values given are for threads lubricated with oil or grease. To determine the grade of bolt or capscrew being tightened, use the following information. Grade 2: No markings or vendor indentification on the head. Grade 5: Letter "S" or 3 lines and/or vendor identification on the head. Grade 8: Letter "V" or 6 lines and/or vendor identification on the head.

SECTION VII
OPTIONAL EQUIPMENT AND ACCESSORIES

CHECK VALVE

The check valve is not adjustable. Leaky valves can sometimes be corrected by disassembling the valve and cleaning the seating surface. If cleaning does not stop the leaking, the valve should be replaced.

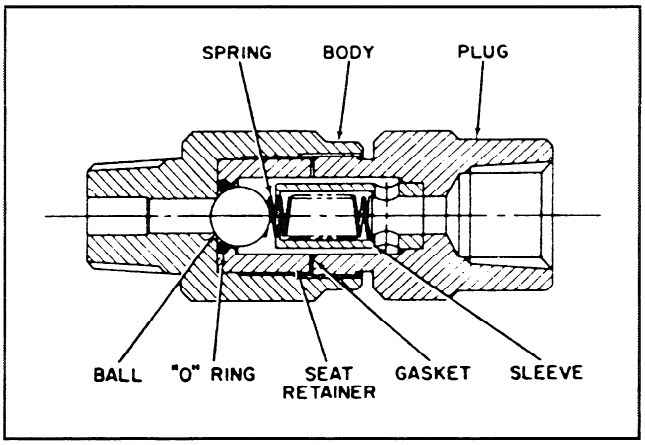


Figure 7-1. Typical Check Valve
(Furnished as optional equipment with certain models.)

AUTOMATIC CONDENSATE DRAIN VALVE

Normally, this valve should require no maintenance. However, if there is evidence of air or condensate leakage through the valve (determined by flow from the drain lines while the compressor is operating loaded), the valve piston O-rings (See Figure 7-2) may be defective, or the piston sealing surfaces on the drain valve body may be scratched or wire drawn.

VALVE DISASSEMBLY - Refer to Figure 1-4 for valve location. To disassemble the valve, refer to Figure 7-2 and proceed as follows:

1. Disconnect the electrical wiring and tubing to the automatic condensate drain valve.
2. Remove the automatic condensate drain valve from the compressor drain leg, and take to a suitable work area. NOTE: TO MAKE RE-ASSEMBLY OF THE VALVE EASIER, CAREFULLY MARK THE DIRECTION OF DISSEMBLY.

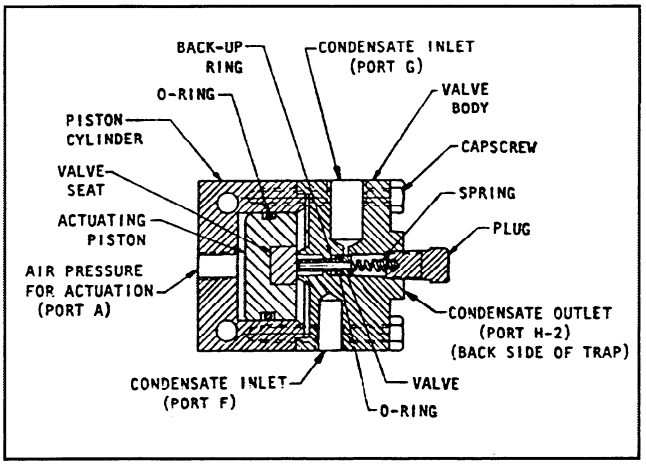


Figure 7-2. Automatic Condensate Drain Valve. (Furnished as optional equipiment with certain models.)

3. Remove the capscrews holding the drain valve body and piston cylinder together. Carefully separate the pieces, and push out the actuating piston.
4. Carefully inspect the sealing surfaces of the piston and piston cylinder. If scratches or slight scoring of the sealing surfaces are present, hand lapping of these surfaces may correct the situation. If the scratches or scoring are excessive, the condensate drain valve must be replaced. NOTE: IF THE CONDENSATE DRAIN VALVE LEAKS CONTINUOUSLY, THIS MAY BE REMEDIED BY MERELY INVERTING THE VALVE SEAT. IF THE VALVE SEAT HAS BEEN INVERTED DURING A PREVIOUS OVERHAUL, THE SEAT MUST BE REPLACED.
5. Re-assemble the valve by reversing the Dis-assembly procedures.
6. Reinstall the condensate drain valve to the compressor drain leg, and reconnect all tubing and electrical wiring.

TIMED AUTOMATIC CONDENSATE DRAIN SYSTEM

Ingersoll-Rand High Pressure Air Compressors may be equipped with a timed automatic condensate drain system. This system is activated by a continuous 30 minute timer which sends an electrical signal (See Wiring Diagram on Page 21 and 22) to a three-way solenoid valve that opens and closes the automatic condensate drain valve, thus expelling the air and condensate from the compressor through the automatic condensate drain valve.

This is a required option on all high pressure air compressors whether operated Automatic Start and Stop. Constant Speed, or Dual Control mode that may be required to run more thn 30 minutes on an initial start or at any other time.

HIGH PRESSURE AIR RECEIVER

If the air system into which the compressor discharges does not have sufficient volume, the compressor will cycle too frequently. In this case, an air receiver must be used to provide enough volume to operate the regulation system of the compressor.

⚠ WARNING

This machine contains high pressure air. Can cause injury or death from flying parts.

Never operate the compressor above the maximum working pressure of the high pressure air receiver.

Air receivers must meet the requirements of the ASME BOILER AND PRESSURE VESSEL CODE, and the safety requirements of the state in which they are used.

SECTION VIII

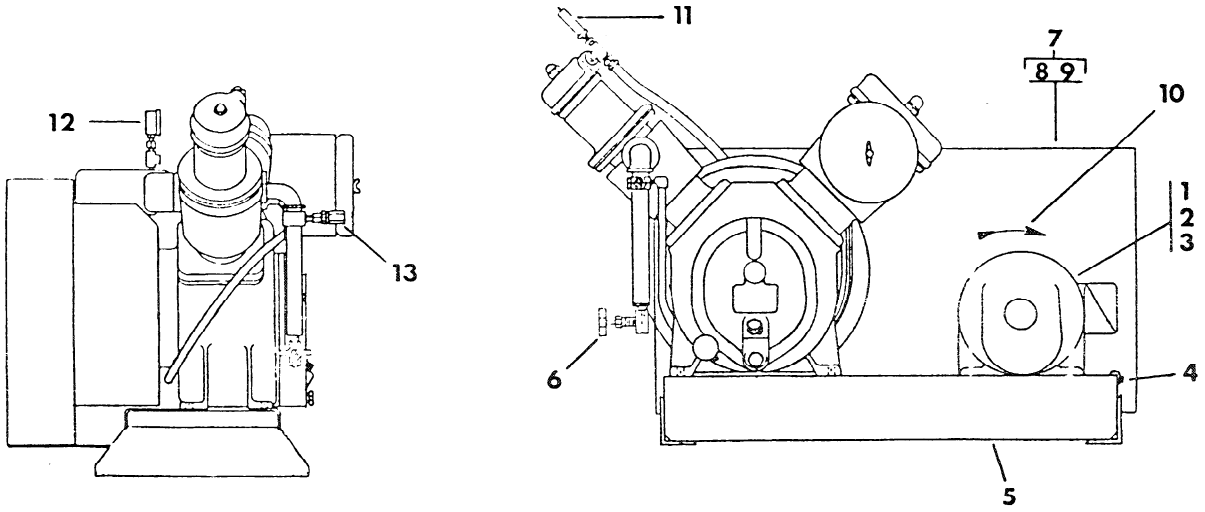


FIGURE 8-1. COMPRESSOR DRIVE, SUBBASE, AND ACCESSORIES.

PARTS LIST

REF. NO.	PART NUMBER MODEL 231	MODEL 41	MODEL 7T2	MODEL 15T2	DESCRIPTION	UNITS PER ASSY.	REC. SPARES 1	2	3
1	*	*	*	*	MOTOR, ELECTRIC	1			
2	*	*	*	*	PULLEY, MOTOR	1			
3	*	*	*	*	BELT, "V"	*		1 Set	1 Set
4	*	*	*	*	TIGHTENER, BELT—COMPLETE	1			
5	32001042	37199783	37728151	32001778	SUBBASE ASSEMBLY	1			
6	30666002	30666002	30666002	_____	VALVE, NEEDLE GLOBE	1			
7	32002602	32002610	32002636	32002644	BELTGUARD COMPLETE	1			
8	32160657	32003386	32003402	32003410	• BACK, BELTGUARD	1			
9	32170748	32003360	32003303	32003329	• COVER, BELTGUARD	1			
10	30286686	30286686	30286686	30286686	DECAL, ROTATION ARROW	1			
11	31385511	32203267	31385511	32203267	VALVE, SAFETY	1		1	2
12	_____	32013898	32013898	32127896	GAUGE, PRESSURE—FIRST STAGE	1	1	1	1
13	32162901	32162927	32162927	32162943	VALVE, CHECK—DISCHARGE (FURNISHED AS OPTIONAL EQUIPMENT WITH CERTAIN MODELS.)	1			1
**	37005840	37005857	32178766	37005857	SWITCH, PRESSURE—NEMA 1	1	1	1	1
**	32028508	32028508	32028508	32028508	VALVE, INLET SOLENOID (FURNISHED WITH OPTIONAL CONSTANT SPEED CONTROL MODELS.)	1			1
**	32039778	32039778	32039778	32039778	VALVE, AUTOMATIC CONDENSATE SOLENOID (FURNISHED AS OPTIONAL EQUIPMENT WITH CONSTANT SPEED CONTROL AND WITH TIMED AUTOMATIC CONDENSATE DRAIN MODELS.)	1			1
**	32049264	32049264	32049264	37151172	VALVE, AUTOMATIC CONDENSATE DRAIN (FURNISHED AS OPTIONAL EQUIPMENT WITH CERTAIN MODELS.)	1			1
**	_____	_____	_____	32013898	GAUGE, PRESSURE—SECOND STAGE	1			1

* Specify Model Number, discharge pressure of compressor, and complete motor nameplate data.

** Not shown in illustration.

STEP SAVER KITS

For your convenience, the following parts and/or spare parts for your compressor are available in parts kits. When ordering the kits below, use kit names as Description and the Part No. as shown.

PART NUMBER MODEL 231	MODEL 41	MODEL 7T2	MODEL 15T2	DESCRIPTION
32137326	32127409	32127441	32127441	KIT, FILTER
3213090	32134058	32133936	32133951	KIT, VALVE/GASKET
32134108	32134066	32133944	32133969	KIT, RING/GASKET
32127359	32127433	32127474	32127516	KIT, BEARING/CONNECTING ROD
30420343	30420459	30420566	30423339	KIT, GASKET
32133977	32133977	32133977	32133977	KIT, DRAIN VALVE-UL104 MAINTENANCE

SECTION IX
TYPICAL WIRING DIAGRAM

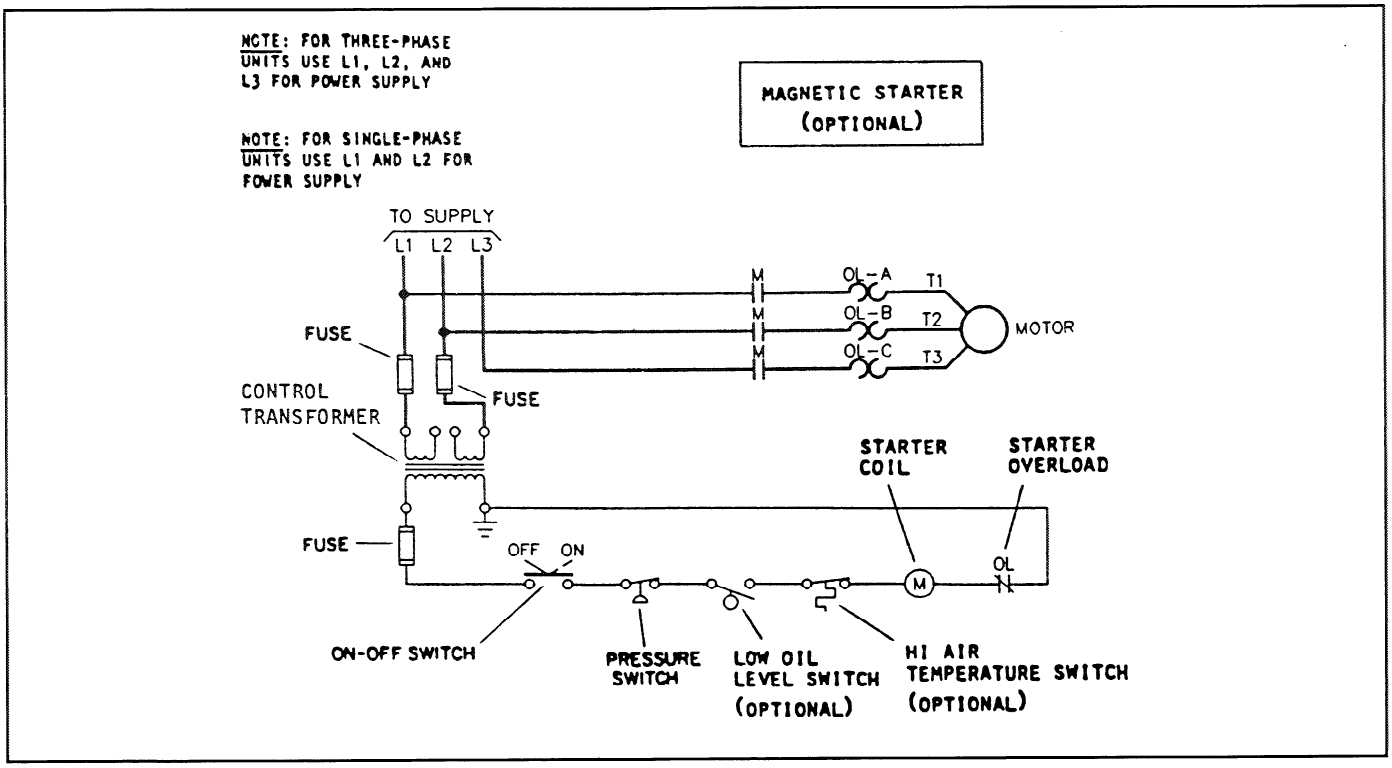


Figure 9-1. Schematic Wiring Diagram for Automatic Start and Stop Control with Optional Equipment.

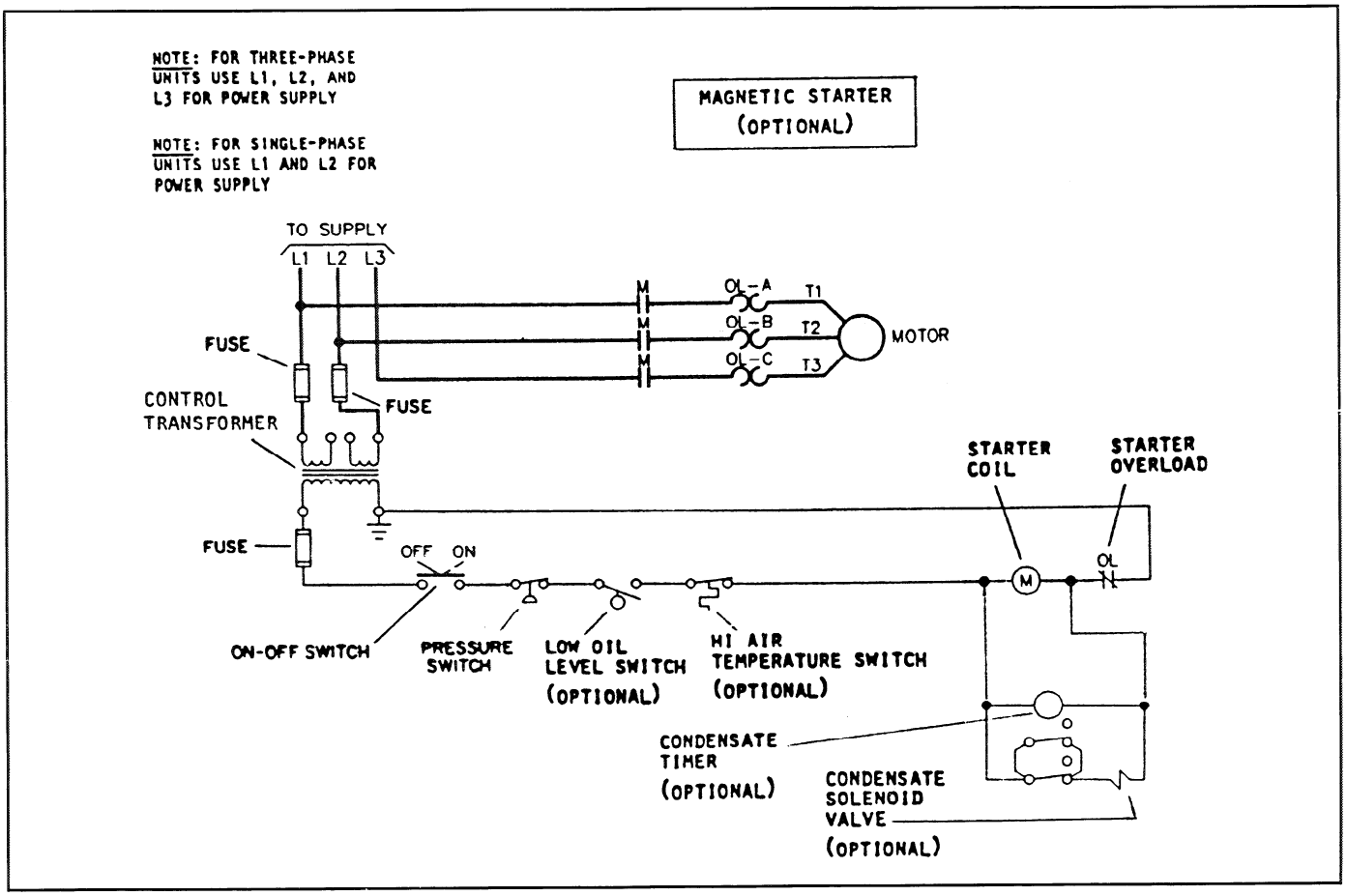


Figure 9-2. Schematic Wiring Diagram for Automatic Start and Stop Control with Optional Equipment and Timed Condensate Solenoid Valve.

TYPICAL WIRING DIAGRAM

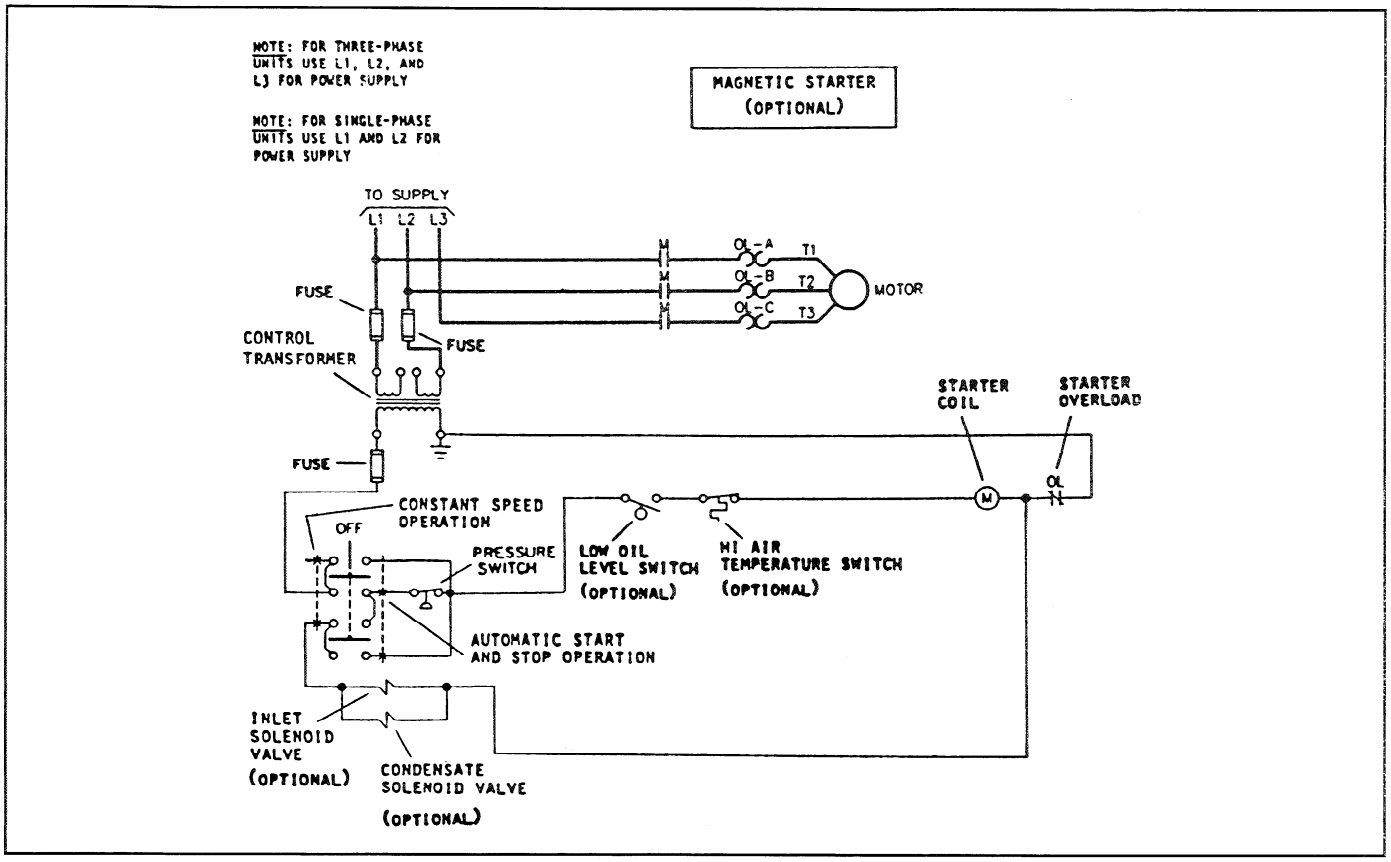


Figure 9-3. Schematic Wiring Diagram for Constant Speed and Dual Control with Optional Equipment.

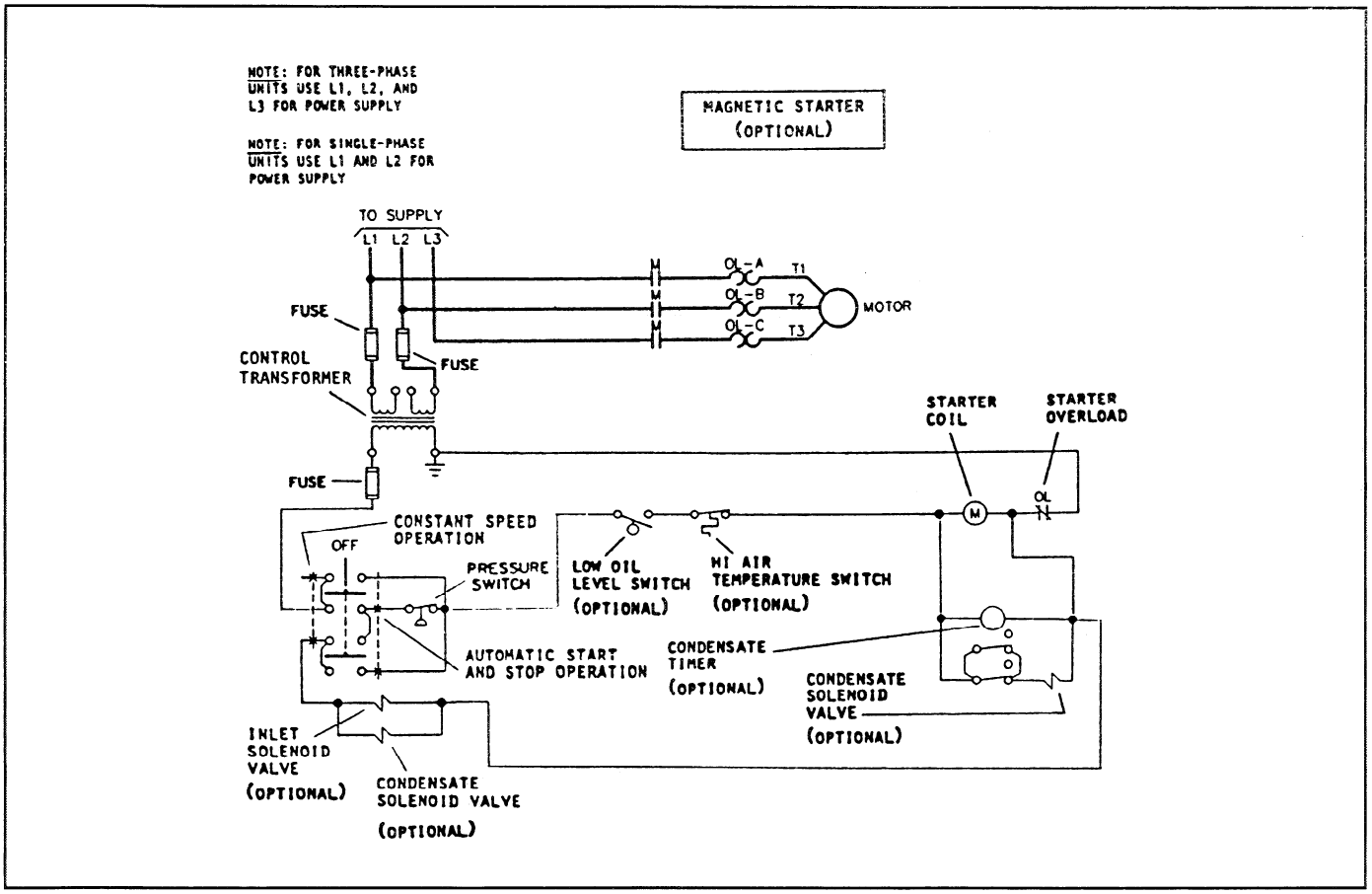


Figure 9-4. Schematic Wiring Diagram for Constant Speed and Dual Control with Optional Equipment and Timed Condensate Solenoid Valve.

⚠WARNING

STATEMENT CONCERNING THE USE OF THIS EQUIPMENT FOR BREATHING AIR AND/OR AQUA LUNG SERVICE.

If the model number on a compressor contains the letters "BAP"; the air compressor is suitable for breathing air services. Compressors that DO NOT bear this designation are NOT capable of producing air of breathing quality. For use in breathing air applications, an air compressor must be fitted with additional specialized equipment to properly filter and/or purify the air to meet all applicable federal, state and local laws, rules, regulations and codes, such as, but not limited to, OSHA 29 CFR 1910.34. Compressed Gas Association Commodity Specifications G-7.1-1966. Grade D Breathing Air, and/or Canadian Standards Association. Should the Purchaser and/or User fail to add such specialized equipment, and proceed to use the air compressor for breathing air service, the Purchaser/User assumes all liability resulting therefrom without any responsibility or liability being assumed by Ingersoll-Rand Company.

The purchaser is urged to include the above provisions in any agreement for any resale of this compressor.

⚠ADVERTENCIA

DOCUMENTO CONCERNIENTE AL USO DE ESTE EQUIPO PARA EL SERVICIO DE AIRE RESPIRABLE Y/O SERVICIO DE BUCEO.

Si el número del modelo en un compresor de aire contiene las letras BAP, el compresor esta diseñado para el uso en servicios de aire respirable. En la ausencia de tal designación, el compresor no puede ser considerado adecuado para producir aire respirable. Para que un compresor sea adecuado para ser usado en aplicaciones de aire respirable, debe estar acondicionado con equipo especializado para filtrar y/o purificar apropiadamente el aire y así cumplir con las leyes, reglas y regulaciones federales, locales y estatales, no limitadas a OSHA 29 CFR 1910.34, las Especificaciones de la Asociación de Gas Comprimido G-7.1-1966 Aire respirable Grado D, y/o Asociación de Estándares Canadienses. Si el comprador y/o el usuario no añaden este equipo especializado y procede a usar el compresor para servicio de aire respirable, el Comprador/Usuario asume toda la responsabilidad resultante de esto sen que ninguna responsabilidad u obligación sea asumida por la compañía Ingersoll-Rand.

Se sugiere al comprador que incluya la anterior provisión en cualquier acuerdo por cualquier re-venta de este compresor.

Hazardous vapors. Can cause severe nausea, fainting or death.

Compressed air or gas from this compressor may contain poisonous vapors or gases.

Certain sprayed material such as paints, insecticides, weed killer, sand, etc., may be harmful if inhaled or used in a closed area.

Never directly inhale the compressed air or gas produced by this compressor.

Always read container labels when spraying paints or poisons.

Always use the compressor in a well-ventilated area.

Use a respirator or mask whenever there is a chance that you might inhale any sprayed material. If a mask is used, read all instructions provided with the mask to ensure it will protect you from the materials you are spraying.

Vapores peligrosos. Pueden causar náusea, desmayo o muerte.

El aire comprimido de este compresor puede contener monóxido de carbono venenoso.

Ciertos materiales propulsados por aire tales como pinturas, insecticidas, arena etc. pueden ser peligrosos si se inhalan o utilizan en un área cerrada.

Nunca inhale directamente el aire comprimido producido por este compresor.

Lea siempre las etiquetas de los contenedores cuando esté rociando pintura o venenos.

Siempre utilice el compresor en un área bien ventilada.

Utilice el respirador o máscara cuando haya riesgo de inhalar cualquier material que esté rociando. Si utiliza máscara, lea muy bien las instrucciones para que usted pueda saber de qué lo va a proteger mientras rocía.

Hazardous voltage. Can cause severe injury or death.

Always disconnect the power supply cord before performing any maintenance or repair work.

Always connect the power supply cord to a grounded electrical receptacle with the specified voltage and fuse protection.

Never use the compressor in rain, in a wet area, or near an explosive environment.

Voltaje peligroso. Puede causar heridas severas o muerte.

Siempre desconecte el suministro eléctrico antes de hacer cualquier mantenimiento o reparación.

Siempre conecte el suministro eléctrico a un circuito adecuado y con el voltaje especificado.

Nunca utilice el compresor en la lluvia, o en un área cerca de una atmósfera explosiva.

Flammable vapors. Can cause a fire or explosion, and result in severe injury or death.

Sparks from the motor's electrical contacts can ignite flammable vapors from gasoline, natural gas or solvents.

Do not operate the compressor in any areas where explosive or flammable vapors or liquids may exist.

Never smoke or use open flame in the vicinity of the compressor or any gas bottle or source.

Vapores inflamables. Pueden causar fuego o una explosión, y el resultado puede ser herida severa o muerte.

Chispas del motor eléctrico pueden encender vapores inflamables de gasolina, gas natural o solventes.

No operan el compresor en ningunas áreas donde vapores o los líquidosexplosivos o combustibles pueden existir.

Nunca fumar o el uso abre llama en la vecindad del compresor, botella de gas o fuente de gas.

Compressed air/gas has great force.

Over-pressurizing the bottle, tank or receiver, or using a receiver which does not meet the design limits for this compressor, can cause them to rupture or explode, and result in severe injury or death.

Changes to the bottle, tank or receiver structure will cause it to weaken and can cause it to rupture or explode, and result in severe injury or death.

Internal rusting in the bottle, tank or receiver will cause it to weaken and can cause it to rupture or explode, and result in severe injury or death.

Pressure beyond design limits can cause the bottle, tank or receiver to rupture or explode, and result in severe injury or death.

Improper use of air tools or attachments can cause an explosion, and result in severe injury or death.

The bottle, tank or receiver is equipped with a relief valve to protect against over-pressurization. DO NOT REMOVE, ADJUST OR MAKE SUBSTITUTIONS FOR THE RELIEF VALVE. Periodically pull the ring on the relief valve to ensure it operates freely. If the valve is stuck or does not operate freely, it must be replaced.

Never drill into, weld to, or alter the bottle, tank or receiver in any manner.

Drain water/condensate from the air receiver daily or before each use.

Pressure switch and unloader valve operation is related to motor/engine horsepower, air receiver rating, and relief valve setting. DO NOT ATTEMPT TO ADJUST, REMOVE OR BYPASS THE PRESSURE SWITCH, OR CHANGE OR MODIFY ANY PRESSURE CONTROL RELATED DEVICE.

Do not use any air tools or air attachments without first determining the maximum air pressure recommended for that particular piece of equipment.

Compressed natural gas compressors are equipped with explosion-proof electrical systems. Ensure any additional electrical equipment is also explosion-proof.

Gas leaks can occur in compressed natural gas compressors or associated piping. Even small leaks pose a potential hazard and should be corrected before the compressor is operated. If a maintenance function involves breaking a gas-tight joint, always recheck for gas leaks after reassembling by using a commercial gas leak detector.

El aire comprimido tiene gran fuerza.

El tanque de aire sobre-presurizado puede causar que el tanque de aire explote o se rompa, y puede resultar en heridas severas o muerte.

Cambios en la estructura del tanque de aire pueden causar que el tanque de aire se debilite causando la ruptura o explosión de este, resultando en herida severa o muerte.

El debilitamiento de la estructura del tanque de aire debido a oxidación interna puede causar rupturas o explosión del tanque y puede resultar en heridas severas o muerte.

La presión de aire fuera de sus limites puede causar que el tanque explote o se rompa, y esto causaría heridas severas o muerte.

El uso impropio de las herramientas neumáticas o sus accesorios pueden causar explosión, y resultar en heridas severas.

El tanque de aire está protegido de sobrepresurización por una válvula de seguridad. NO QUITE, HAGA AJUSTES, O SUSTITUCIONES EN ESTA VALVULA. Ocasionalmente hale el anillo en la válvula de seguridad para asegurarse de que la válvula funcione libremente. Si la válvula está atascada o no funciona, debe ser reemplazada.

Nunca perfore, suelde o cambie el tanque de aire en ninguna forma.

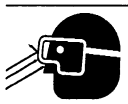
Drene el agua/condensado del tanque de aire diariamente o antes de cada uso.

NO TRATE DE AJUSTAR, REMOVER, O DERIVAR EL BOTON DEL INTERRUPTOR DE PRESION, O CAMBIE Y MODIFIQUE CUALQUIER ESTRUCTURA RELACIONADA CON EL CONTROL DE PRESION.

No utilice ninguna herramienta neumática o accesorio sin determinar la presión máxima de aire comprimido que se recomienda para esa herramienta en particular.

Los compresors comprimidos de gas natural se equipan con sistemas eléctricos que no estallarán. Asegure cualquier equipo eléctrico adicional es también incapaz de estallar.

Los escapes de gas pueden ocurrir en los compresors naturales de gas o asociados tubos. Cualquier escape es un peligro potencial y debería corregirse antes de el compresor se opera. Si una función de mantenimiento involucra quitando un sujetador, siempre detecta cualquier gas escapa después de armar nuevamente por usar un detector de escape de gas.



Rotating compressor. Can propel dirt, sand, metal shavings, etc., and result in severe injury.

Never point an air nozzle or air sprayer toward any part of the body, or toward another person.

Always wear safety glasses or goggles when servicing.

Aire comprimido. Puede expulsar polvo, metal o arena etc. y puede resultar en heridas.

Nunca apunte la boquilla hacia alguna parte del cuerpo o hacia otra persona.

Use siempre gafas protectoras.

Moving parts. Can cause severe injury.

Always disconnect the power supply before attempting to perform any maintenance or repair work.

Always ensure the pressure is released from the compressor, bottles, tanks, receiver and air attachments before performing any maintenance or repair work.

Always disconnect the power supply on electric motor models if the compressor is to be left unattended.

Never operate compressor with the fan shroud removed, or if the shroud is damaged or broken.

Las partes en movimiento pueden causar heridas severas.

Desconecte siempre el suministro eléctrico antes de cualquier mantenimiento ó reparación.

Desconecte siempre el suministro eléctrico si el compresor no va ser usado.

Asegúrese que el aire a presión es liberado del compresor, del tanque de aire, y demás accesorios de aire antes de hacer cualquier mantenimiento o reparación.

Nunca opere el compresor sin el guarda poleas. Nunca opere el compresor con una polea dañada o rota.

Hot parts. Compressors get hot while running, and can cause severe burns if touched.

Never touch the compressor, motor/engine, or tubing during or shortly after compressor operation.

Partes calientes. Los compresores de aire se calientan en operación y pueden causar quemaduras severas.

Nunca toque el compresor, el motor, o la tubería de descarga durante o poco después de operar el compresor.

WARNING: THE EXPORT OR RE-EXPORT OF THIS DRAWING OR A PRODUCT PRODUCED BY THIS DRAWING IS SUBJECT TO U.S. EXPORT ADMINISTRATION REGULATIONS AND OTHER APPLICABLE GOVERNMENTAL RESTRICTIONS OR REGULATIONS.

Look What INGERSOLL-RAND *Can Do For YOU. . .*

Vea Lo Que INGERSOLL-RAND *Puede Hacer Por USTED. . .*

EFFICIENT FIELD SERVICE

We maintain a highly trained staff of technicians to service your equipment for preventive maintenance, or to assist you should emergencies ever occur.

EFICIENTE SERVICO EN EL CAMPO

Mantenemos un grupo de mecánicos entrenados para suministrarle mantenimiento preventivo o atender cualquier emergencia que puede tener.

COMPLETE REPAIR SERVICE

Our trained technicians will repair or overhaul your equipment to factory specifications, using only genuine I-R parts.

COMPLETO SERVICIO DE REPARACION

Mecánicos entrenados repararán su compresor según los métodos recomendados por fábrica usando solamente partes genuinas Ingersoll-Rand.

SPECIAL ENGINEERING SERVICE

We can help you identify and solve your compressed air problems by evaluating your needs and recommending the proper compressor and air piping system to give you maximum efficiency.

SERVICO DE INGENIERIA ESPECIAL

Nosotros podemos ayudarlo con sus problemas de aire comprimido investigando sus necesidades y recomendando el compresor y el sistema de aire adecuados para lograr máxima eficiencia.

SPARE PARTS

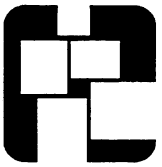
By stocking genuine I-R spare parts, we can help you avoid costly delays, or substituting inferior parts. Using genuine I-R parts on your I-R equipment will help to keep even older machines running in good-as-new condition.

PARTES DE REPUESTO

Mantenemos partes genuinas Ingersoll- Rand, evitando posibles sobrecostos debido a demoras en la sustitución de partes menores. Como resultado, los equipos antiguos son mantenidos como nuevos.

COMPLETE STOCK OF EQUIPMENT

We carry a complete line of I-R equipment and accessories designed to met any compressed air application. We are backed by Ingersoll-Rand's prompt factory shipment to ensure you on-time delivery.



STOCK COMPLETO DE EQUIPOS

Nuestro stock de máquinas completas que pueden encargarse usualmente de cualquier necesidad, está soportado por un eficiente sistema de despachos de fábrica de Ingersoll-Rand para asegurarie entrega a tiempo.

A SUBSTITUTE IS NOT A REPLACEMENT

Ensure you get peak performance and longevity out of your Ingersoll-Rand compressor by insisting on genuine Ingersoll-Rand replacement parts and maintenance kits. Not only are the replacement parts made to precise dimensions and OEM-specified metallurgy, but each part is backed by the Ingersoll-Rand warranty. Your local Air Center, Full-Service distributor or direct Ingersoll-Rand salesperson will work with you to ensure you get the parts you need to do the job right. Equip your machines with only the best - Ingersoll-Rand Genuine Parts.

UN SUSTITUO NO ES UN REEMPLAZO

Asegúrese que obtiene máximo desempeño y duración de su compresor insistiendo en usar solamente partes de reemplazo genuinas y kits de mantenimiento Ingersoll-Rand. No solamente están construidas con dimensiones precisas y especificaciones exactas de metalurgia, sino que cada parte está respaldada por la garantía Ingersoll-Rand. Su Air Center, su Distribuidor de Servicio o el personal de ventas directo de Ingersoll-Rand trabajarán con Usted para asegurarle que recibe las partes para efectuar el trabajo correcto. Equipe sus máquinas sólo con lo mejor - Partes Genuinas Ingersoll-Rand.

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